RAILROAD GAZETTE

FRIDAY, APRIL 6.

Contributions.

Heavy Wheel Service.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your notice of the wheel mileage on the Lake Shore road, I wish you had added the mileage some of the wheels made, as indicated in the report under head of "Greatest Mileage," as you will see some of them made 136,058 miles for the 26-in., 154,119 for the 28-in., 146,172 and 171,800 miles for the 30-in., and 185,054, 189,733, 214,139 and the extraordinary mileage of 500,300 miles by the 33-in. When chilled wheels make such records they should be noticed. Z.

Tracklaying Machinery at the Chicago Exhibition.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There being only two inventors of patent tracklayers beside myself, but many dealers in the article, I ask you whether it should not be the duty of each of the claimants for patent tracklayers to have their respective "unrivaled" machines exhibited at the coming Exhibition of Railroad Appliances at Chicago in May and June next, in order to enable the railroad men to examine into the merits and reject what is called antediluvian in that line? Please invite through the columns of your valuable paper, the respective inventors of and dealers in patent tracklayers to comply with the above request for their own and the railroad community's benefit.

ALBERT MICHELSON, Sup't American Ry. Construction Co., and Patentee of the "Monarch" Tracklayer.

The Westinghouse Suit Against the American Brake Company.

The American Brake Company,
ST. LOUIS, April 3, 1883.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As the notice made in your last issue of the suit brought by the Westinghouse Company against our company is liable to create wrong impressions, I desire to explain that the suit is for the alleged infringement upon a patent of George Westinghouse of Oct. 28, 1873, in the use of a peculiar form of lever which we only use in our upright cylinder steam driver brake, *and has no reference to our horizontal cylinder driver brake.* Not one in ten of the brakes we have made are of the upright cylinder pattern, the horizontal cylinder pattern being our standard brake for engines. It is perhaps needless to say that the suit has nothing to do with our automatic freight car brake.

JOHN B. GRAY, Vice-President and General Manager,

The Card Catalogue System.

MAUCH CHUNK, Pa., March 31, 1883.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you allow a railroad engineer to contribute a few words upon the systems of filing notes and memoranda? The system of card catalogues, as recommended by you in your last issue, is admirable as long as the interested party has a permanent name or a so-called permanent position. But the large class of railroad men and engineers for whom you recommend this system are wanderers during the early part of their career, when their energy and activity are also greatest, and they are more likely to grasp every little grain of knowledge and information that comes in their reach. They live in hotels, boarding-houses, shanties and log houses. Where is the space for an elaborate system of filing with card-boxes, pigeon-holes, special cases, etc.: and yet some system to keep the loose papers, pamphlets, sketches, which are generally thrown in wild confusion into a trunk, is more necessary than ever. I will, therefore, presume to describe a plan which I have after some years' experience allowed to supersede all former attempts.

I start with the principle that a transcribing or re-writing of the matter to be filed should under no circumstance be required. That to save time and secure a future for the collection of notes on any size or kind of paper, in pamphlet or newspaper form, photographs, small drawings and blue prints, should all fit into the system without having to wait for the ideal day "when work is slack," or without depending on night work to systematize, transcribe, reference, index and file the mass of data collected since the last quarterly or annual house cleaning. To obtain this all papers are filed in paste-board cases or boxes, each box being marked with its distinctive subject. Any of the numerous patent "tranfer-cases," "index-cases" or "invoice and letter-cases" will serve and are easily obtainable. I usually prefer to have the cases without any index or filing fixtures, and just throw the notes into the box along with similar matter. Sometimes when the subjects in one box are distinct I insert an index file (Amberg's index file), and use the alphabetical divisions to separate the papers according to sub-divisions. Where the general subject embraces a large amount of matter, I use several cases, one for notes, one for the pamphlets and printed matter, one for photographs, maps and blue prints, catalogues, price lists, etc.

The advantages are numerous. The system requires no indexing. Matter appertaining to the same general subject is filed together, whether written or printed, newspapers, pamphlets, photographs, plans, catalogues, price-lists, etc. busy with special work, or off on special duty for several weeks, all notes bearing more immediately on the duties before one can quickly and without disturbing the system be collected or taken along. If any subject becomes too voluminous for one case, it can be easily and quickly subdivided without disturbing the system (while an error of judgment in indexing the card system in the start would cause considerable trouble to adjust later). The boxes or cases require no regular stands; they can be placed on the floor, on tables, shelves, or left in a trunk.

To illustrate better I will assume a collection of about fifty "Amberg invoice and letter-transfer cases," about ten of them having also the "index file," and will mention the following general headings as indicative of a railroad engineer's classification: "R. R. Statistics and General Information;" "R. R. Organization and Law;" "R. R. Rules, Regulations and General Orders;" "R. R. Reports;" "Rolling Stock—Cars;" "Rolling Stock—Motive Power;" "R. R. Accounting—Notes and Blanks;" "Transportation—Notes and Blanks;" "R. R. Materials and Tools;" "Track" "Maintenance of Way—Notes and Blanks;" "Maintenance of Way—Structures;" "R. R. Architecture," "Civil Architecture;" "Building Materials;" "Yards and Shop Systems;" "Depots;" "Masonry and Foundations;" "R. R. Construction (General Notes, Specifications and Contract Forms, Maps);" "Tunnels;" "Iron Bridges (Theory, Specifications, Examples);" "Wooden Bridges and Trestles;" "Roofs;" "R. R. Location (General Notes, Maps, Engineering);" "Machinery;" "Streets and Roads;" "River and Harbor Work;" "Wharfs;" "Hydraulic Work;" "Surveying;" "Iron and Steel;" "Tests of Materials;" "Iron Bocks;" "Special Work;" "Transactions of Societies;" "Catalogues of Books," etc., etc.

This system is not dependent on a large outfit to make a start. For example, above collection could be started with five or six cases with general headings, the number to be increased and subdivisions made with the increase of the collection.

For the purpose of the lexicographer, compiler or professional man securely and snugly settled, I admit certain advantages of the card system, but for the average professional or railroad man, dealing with a limited number of subjects, changing location from time to time and constantly moving, I maintain that the system described above is certainly more feasible than the card system and certainly better than no system. WALTER G. BERG.

Consumption of Fuel in Locomotives.

California Southern Railway Co.
NATIONAL CITY, Cal., March 23, 1883.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A great deal of interest is being manifested among railroad men as to the relative economy of English and American locomotives. There appears to be but very limited statistics regarding the amount of fuel consumed per mile in America. It is not customary here to ascertain the ton mileage or even the car mileage, but the standard of comparison seems generally to be the fuel used per train mile. Locomotive performance sheets usually ignore the weight of train hauled, and boast is made by the various roads of the mileage made to the ton of coal. This is very misleading and unsatisfactory. Without more exact statistics we cannot compare our locomotive performances either with each other, with those in England, or in any other country where attention is paid to the work locomotives are doing. For instance, in looking over the locomotive returns in a January number of the *Railroad Gazette*, I notice that one division of a prominent road made 97 miles to the cord of wood, and the same division made only 30 miles to the ton of coal, and the price of coal was $6.50 per ton, while wood was $4.70 per cord. Why this use of expensive coal? It was perhaps because the performance sheet was not designed to show the work locomotives were doing. In all probability wood on the division alluded to was burned upon some small branch with a light traffic, while coal was used upon the main line. Under similar circumstances, a cord of wood cannot perform as much work as a ton of coal. Some months ago, while employed on one of the New England roads, I made a series of experiments in order to ascertain the difference between wood and coal. The same locomotive was used in both cases, and I obtained the following results:

	Kind of fuel. Wood.	Coal.
Number of trips made	4	4
Date of experiment	September.	October.
Size of locomotive	16×24 cylinders and 5-ft wheel.	
Average number train miles	71.5	71.5
Average time from departure to arrival	6 hours 54 minutes.	6 hours 25 minutes.
Length of stoppages at way stations	2 hours 54 minutes.	1 hour 16 minutes.
Length of time actually moving	4 hours.	5 hours 9 minutes.
Number of miles per hour moving	17.875	13.88
Number cars per train, including van	24	28
Weight of train, including van	360.4 tons.	470.1 tons.
Weight of conductor's van	5.75 "	5.75 "
Average weight of each car, excluding van	15.41 "	16.45 "
Average weight of merchandise in each car	6.33 "	7.29 "
Average weight each car empty	9.08 "	9.16 "
Amount of fuel used, in pounds	8,625	3.360
Fuel used, in pounds, per train mile	120 6	46.9
Fuel used, in pounds, per car mile	5.02	1.67
Fuel used, in pounds, per ton mile	0.33	0.104
Water evaporated, in pounds	21,991.20	23,499
Pounds water evavorated to pound of fuel	2.54	6.9
Temperature of water in tender	70°	53°
Average temperature in shade	68°	52°
Average steam pressure in boiler	133 9	134.5
Condition of rails	Wet.	Dry.
State of weather	Light rain.	Fair.
Direction and force of wind	Light, north.	None.

The wood used weighed 3,000 lbs. to the measured cord. It would be very difficult on many roads to ascertain precisely the tonnage of every train, but the number of loaded cars hauled could easily be kept, passenger coaches or empty cars when moved being figured into loaded cars. This car mileage would be a sufficiently accurate basis of comparison, and performance sheets made by this system would indicate to a certainty the coal engines are burning as well as the work they are doing. There is no satisfaction in exhibiting a performance sheet that shows a fuel consumption and omits to give the reader any knowledge of the work done. One of my locomotives last month made 2,539½ miles and consumed 31 tons of coal exactly. This would be equivalent to burning 24½ lbs. per train mile, which, according to the usual standard, is most laudable. Owing to our severe grades, which in places are 145 ft. to the mile and to our curves, which are frequently 12°, the loaded-car mileage is not high.

CALIFORNIA SOUTHERN RAILROAD,
Mechanical Department.
Performance of Locomotives for the Month Ending Feb. 28, 1883.

Number of locomotive	Name of Engineman	Mileage. Locomotive	Mileage. Loaded car	Fuel Issued. Coal-tons	Oil issued—Pints	Pounds fuel used per car-mile	Pints oil used per locomotive mile
8	Xauder, A. D	2,539½	13,377	31.0	154	4.6	0.6

There is a growing desire in America to improve our locomotives by scientific designs, proportioning correctly their details, adopting template systems and reducing the cost of repairs.

I trust that railroad companies will also realize the importance of keeping accurate statistics of the coal burned to the mile. BERKELEY POWELL,
Mechanical Superintendent.

Track-laying—Running of Joints on Curves.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In laying track upon curves the joints will "run out of square," that is, if the joints of the inner and outer rail are exactly opposite one another at the beginning of the curve, the joints of the inner rail will gradually gain upon those of the outer rail, as we progress around the curve, until the joint ties lie considerably askew. The running of the joints upon the curves is due to the fact that the outer rail is longer than the inner one.

It is desirable that the ties should be at right angles to the rails, otherwise the spacing of the ties will not be equal under both rails; moreover it is difficult to keep the track to true gauge unless the ties are at right angles to the rails.

To correct this tendency to run it is customary to cut off a piece of one rail occasionally, putting the shortened rail upon the inside of the curve and thus bringing the inside joint as much behind the outer one as it was ahead of it at the last joint. In the hurry of tracklaying the men rarely do a neat job of cutting. They generally cut off enough so as to save one of the fish-plate holes. Then they have but one hole to drill. So they cut off five or six inches at once. This means that the joints are at least 2½ in. out of square.

A better method is to order from the rolling mill one or more car-loads of rails cut two or three inches shorter than the standard length and properly punched for the fish-plates. Some of these cut rails should be kept on the tool car at the head of the supply train, so as to be handy when required. If 30-ft. rails are to be used order a car-load of rails cut to 29 ft. 9 in., then the joints never need be more than an inch and a half out of square.

Some railroad men prefer to have their track laid with alternate joints, *i. e.*, with the joints of one rail opposite the middle of the other rail. But with alternate joints it is just as important that the joints should maintain their proper relative position for the reasons before mentioned.

The engineer is sometimes puzzled to know how many cut rails to order, or how many will be required on a given curve.

A simple calculation will show that it can be easily reckoned:

Let g = gauge of track,
" R = radius of inner rail,
then $R + g =$ " " outer rail.

Then for a whole circle of 360 degrees:

$2\pi\ (R + g)$ = length of outer rail,
$2\pi R$ = length of inner rail.

Let d = difference in length of inner and outer rails,
then $d = 2\pi\ (R + g) - 2\pi R = 2\pi g$.

For standard gauge $g = 4$ ft. 8½ in. and $d = 29.58$ ft.

But an ordinary curve is only part of a circle. For a curve whose central angle is m degrees

$$d = \frac{m}{360}\ 29.58 \text{ ft.}$$

Make $m = 1$ and we have

$$d = \frac{29.58}{360} = 0.986 \text{ inch.}$$

For all practical purposes, it is correct to allow one inch for each degree of central angle.

It will be noticed that R immediately disappears from the equation. That is, it is immaterial whether our curve is a one degree or a six degree curve, a simple or compound curve. The total central angle will show us how much the joints will run. For instance, if we have 870 ft. of 4° curve, the central angle subtended by this curve is $8.70 \times 4° = 34.0°$.

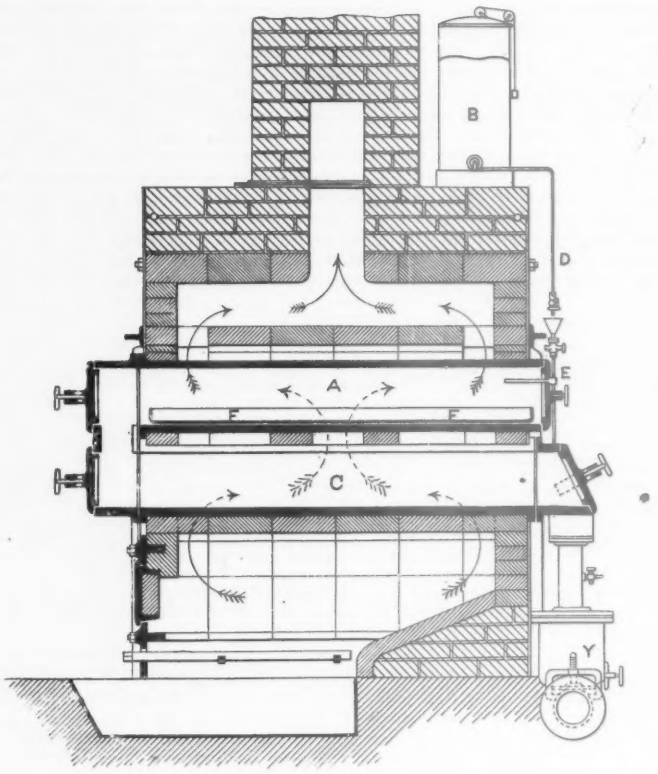


Fig. 1.

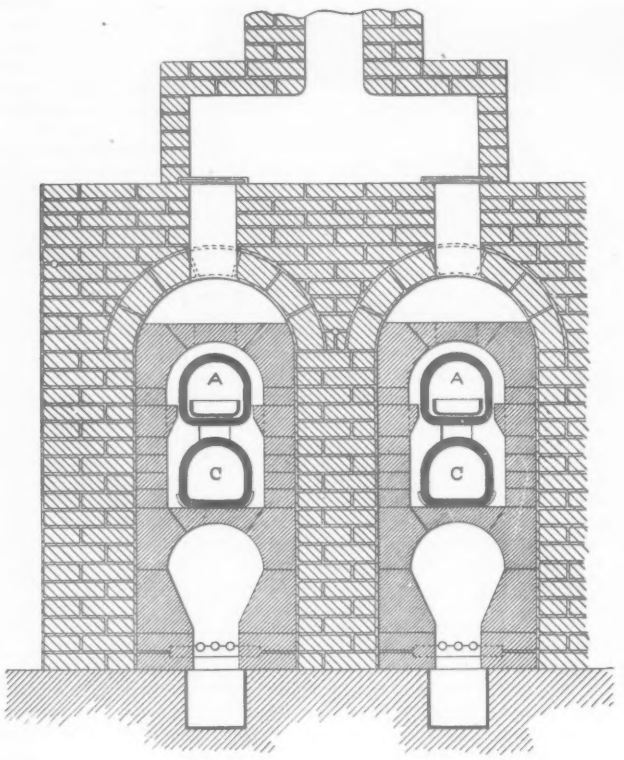


Fig. 2.

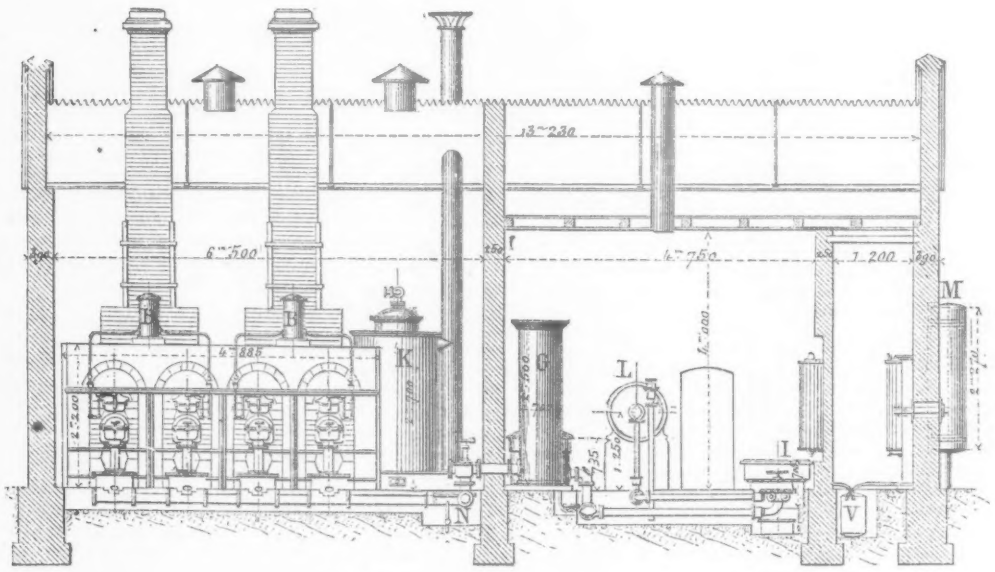


Fig. 3.

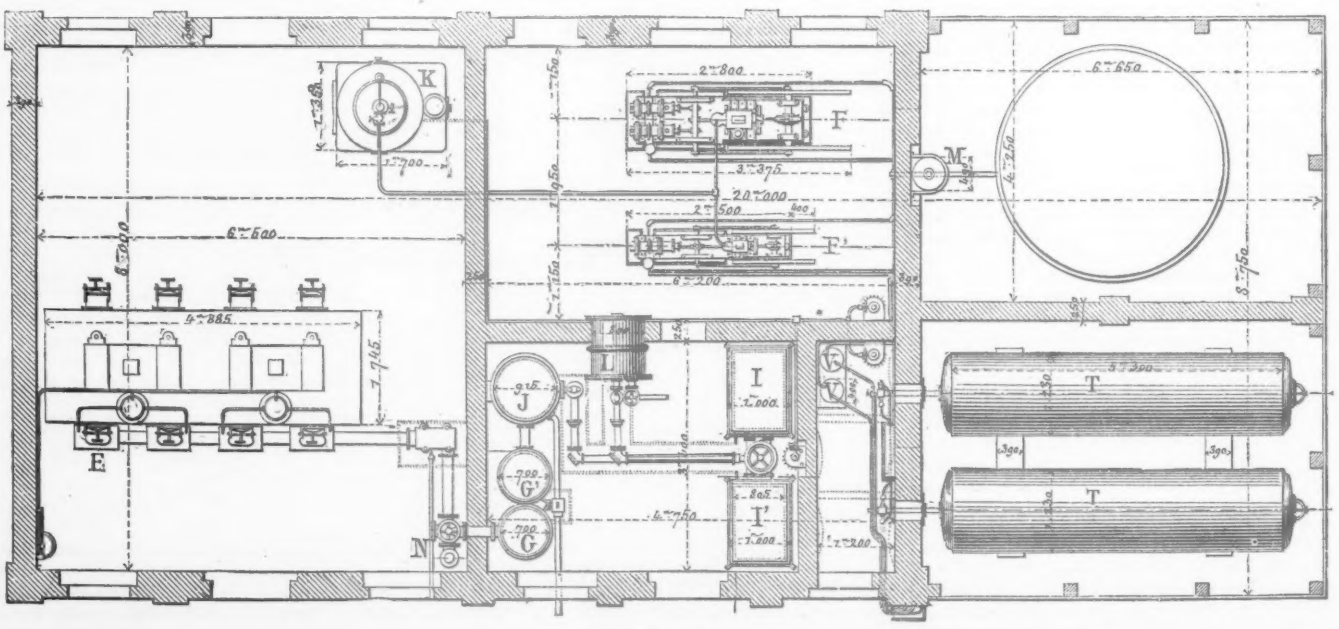


Fig. 4.

WORKS FOR THE MANUFACTURE OF PINTSCH'S OIL GAS.

Hence the outer rail will be 34.8 in. longer than the inner one. To correct this we shall require 11 rails 29 ft. 9 in. long, and one rail 29 ft. 10⅞ in. long. The latter can be cut from a 30 ft. rail. The 870 ft. of curve will require 29 30-ft. rails on the outer side, and we have 12 cut rails to put in the inner side, leaving 17 whole rails for the inner side, or one cut rail to one and a half whole rails for the inside. These should be arranged in ones and two alternately.

To ascertain how many cut rails will be required on a given section of railroad, find the total amount of curvature on the section, then allow one inch to a degree. If the cut rails are to be three inches shorter than the standard rail, we shall require one-third as many cut rails as there are degrees of curvature on the road. It would be well to order an excess of cut rails, so as to have some on hand for future repairs. In ordering cut rails instruct the shipper to mark them plainly, so that they will not get mixed up with standard length rails. A good way to distinguish them is to paint both ends of the cut rails white.

It will save trouble for years after the track is laid if pains are taken to place the points exactly opposite one another, or exactly opposite the centre of the other rail, if that method is preferred. If originally laid out of square they will always remain so, and it causes much unnecessary cutting in attempting to square up the joints to relay the road with new rails.

T. APPLETON, C. E.

The Pintsch System of Lighting Railroad Cars with Gas

The idea of lighting railroad cars with gas stored by compressing it in reservoirs carried on the train is an old one, but the practical use of gas in this way is attended with many difficulties. One of these is the condensation of tarry matter in the gas when it is compressed. Such condensation deprives the gas of its illuminating quality, and, therefore, after compression, ordinary coal gas gives very little light. To get over this difficulty, in the Pintsch system gas made from oil, which has a very much greater illuminating power than coal gas, is used. To show the difference in the two kinds of gas it is stated that with a burner which consumes 5 ft. of gas per hour coal gas gives a light equal to from 16 to 20 candle-power, whereas oil gas gives from 60 to 70 candle-power. By compression such a large proportion of the hydro-carbons of coal gas are liquified that afterwards it has an illuminating power of only from 8 to 10 candle-power. It is said that not only is oil gas more fixed in its character—that is, that a smaller proportion of its hydro-carbons are liquified by compression, but as it is so much richer in illuminating power that even if the same proportions of the elements are condensed, it still has a very much high illuminating power after compression than coal gas when similarly treated. For these reasons oil gas made out of crude petroleum, petroleum refuse, animal or other oil, is used in the Pintsch system of lighting cars.

The appliances used for producing the gas consist of one or more furnaces, each containing two cast-iron ⊔-shaped retorts of equal size, one above the other. Figs. 1 and 2 are respectively longitudinal and transverse sections of these furnaces. *A A* are the upper retorts and *B B* the lower ones. In setting these, care is taken to protect them against the direct action of the flame by fire-brick, but at the same time the arrangement is such as to permit of their being heated uniformly over their whole surface.

The material from which the gas is made is stored in a reservoir *C*, 1, from which it is conveyed by pipes *D* and *E* into the retort *A*. This retort contains a pan *F F*, which receives the inflowing oil. The purpose of this pan is to retain the oil until it has entirely evaporated and thus protect the retort from the sudden cooling action which would take place if the liquid oil came in direct contact with the retort. The pan also facilitates the cleaning of the retort, as the greater part of the coke and other refuse remains in this pan, which can readily be removed from the retort. After the oil is vaporized in the upper retorts *A A*, it passes down into the lower retorts *B B* and is then subjected to a higher degree of heat, and thus completely decomposed, so as to be converted, as nearly as possible, into a fixed gas, or one which is not easily condensed.

Fig. 3 is a transverse section of the gas works, showing two pairs of furnaces. Fig. 4 is a plan of them. The gas on leaving the retorts passes through *Y* of fig. 1 into the condenser *G*, fig. 3, where it is freed from tar. The latter flows out and the gas proceeds to the washer *J* and the purifiers *I* and *I*. From there it passes through the meter *L*, which has a dial-plate in the pump room, so that the attendant can see at any time the amount of gas produced. From the meter it flows into the gas-holder *W*, fig. 4, from which it is drawn out by the pumps *F F*. On its way from the holder to the pumps it passes through the freezer *M*, where it deposits any excess of aqueous vapor it may contain.

When the gas is to be used for lighting railroad cars it must be compressed into accumulators *T T*, fig. 4, which are large cylindrical plate-iron reservoirs. The gas is compressed by pumps *F F* so as to have a pressure of from 150 to 180 lbs. per square inch. The pumps for compressing the gas are constructed so as to have the minimum amount of clearance spaces, and as a great deal of heat is developed during the process of compression, the cylinders of the pumps must be cooled by a stream of water running around them.

One small pump making 50 revolutions a minute compresses, per hour, about 600 cubic feet of gas, and is sufficient for compressing that amount in the time named. Nevertheless, it is desirable to have two such pumps, in case one of them should break down or get out of order.

From the pumps the gas is conducted by pipes to the traps *V V*, which retain the liquid hydrocarbons condensed by the compression. From the tops of these traps pipes convey the dry gas into the reservoirs *T T*. In passing from *V* to *T* the pipes and valves are concentrated in what is called a "regulating case," by which the pressure in any or all the reservoirs, or in the main line of pipes leading to the filling stands, can be regulated.

From the reservoirs *T T* a subterranean line of pipes communicates with filling posts alongside the tracks on which the cars are to be supplied with gas. These posts are placed about a car's length apart. Each post has a suitable cock. During the process of supplying the reservoirs in the cars with compressed gas, the pipes attached to the filling posts are connected by strong india-rubber hose with the car reservoirs, and the valve is then opened and the gas then rapidly flows in until the gauge shows a pressure of 150 lbs. The whole process of filling the reservoirs of a train of eight or ten cars for a run of forty hours of burning hours occupies only about eight or ten minutes.

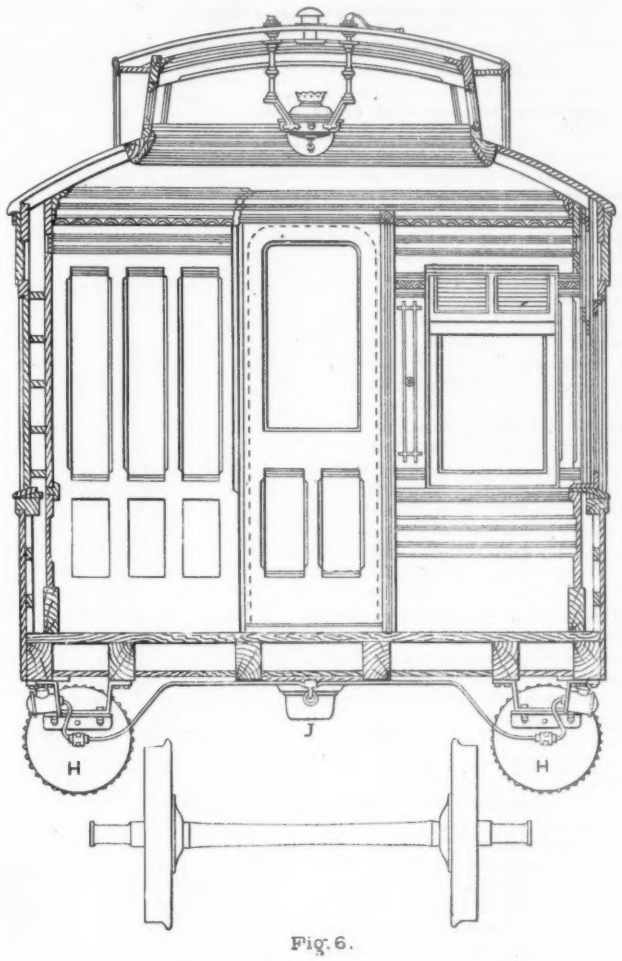


Fig. 6.

Figs. 5 and 6 represent a car equipped with the apparatus for using gas on the Pintsch system. *H H* are the reservoirs, from 16 to 20 in. in diameter by 8 ft. 6 in. in length. The size of these can be modified to suit circumstances. Each car has two of these, one on each side, as shown in fig. 6.

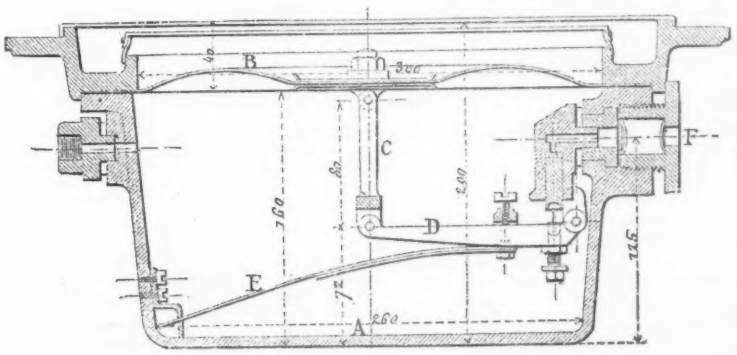


Fig. 7.

PINTSCH REGULATOR.

It is obvious that when compressed gas is used for illuminating purposes there must be some method employed for regulating its pressure, because after the reservoir is first filled the pressure of the gas in it steadily diminishes as the supply is consumed. It is therefore essential that some apparatus should be placed between the reservoirs on the cars and the burners to keep the pressure at which the gas escapes uniform. *J*, fig. 6, is the regulator and is shown in section and in a larger scale by fig. 7. It consists of a cast-iron conical vessel, 12 in. in diameter and 6 in. high, the upper part of which is closed by a gas-proof membrane made of specially prepared leather *B*. To the centre of this membrane is fastened a rod *c'*, which is connected by its other end to the lever *D*. This lever has a regulating valve resting on it near its end, on the left, which serves to admit gas into the regulator through the aperture *F*. A spring *E* serves to depress the lever *D* and open the regulating valve. When the pressure in the regulator and on the membrane *B* reaches a certain point, it overcomes the elasticity of the spring and closes the valve, and thus excludes the further inflow of gas until the pressure is reduced. The spring and lever are so adjusted as to maintain the gas in the regulator at a pressure equal to a column of 1½ in. of water. As the gas passes away to the burners for consumption the deficiency is continually made good, and the action of the regulator is so perfect that the flame is not in the least affected by the vibrations of the car. A ¼-in. pipe conducts the gas to the burners, which are conveniently placed in the car roof, and this is the largest pipe used in the car. There are means for extinguishing all the lights in a car at the same time, and each car is further fitted with an arrangement for turning all the lights down to a mere glimmer at once and of turning them up again.

This is very useful in cases where the train only requires to be illuminated intermittently, as when passing through tunnels.

Fig. 8 represents a section of one of the lamps which are used. They are especially designed for railroad service, the object being to maintain a perfectly steady, even flame under all conditions. By certain improvements more recently introduced the maximum amount of illumination is obtained from a given quantity of gas. The flames are enclosed in the glass globe *G*, and thus the air to feed the flames is obliged to enter at the holes at *A A*, it then passes upwards to the top of the cylinder: *B B*, which incloses the two flues *D D*, and is prevented from going directly to the flame by the diaphragm *C*; it then passes down this cylinder

B B, coming in contact, during its downward course with the hot flues *D D*. Arriving at the bottom of this cylinder it is again turned aside and now has to pass over the hot reflector plate *E*, to the holes *F*; passing through *F* it reaches the flames at the burner, *N N* without further obstruction. Thus the heat from the products of combustion passing up the flues *D D* is constantly returned to the flames by the incoming air, the result being to give the flame a greatly increased efficiency as to illumination.

As shown, the products of combustion pass up the flues *D D*, a separate flue being provided for each flame. Just above the tops of the flues there is suspended a metal guard-plate *P P*, which prevents any sudden draughts blowing down upon the flames. To the plate *E* there is attached a white porcelain-enamel reflector, which is designed to evenly distribute the light through the car. These lamps may also be constructed with three or four flames each.

Another lamp used is called the "sun burner." This lamp also feeds its flames with air previously heated. Its reflecting surface, however, instead of being a removable plate, is the body of the lamp itself, heavily coated with the porcelain-enamel. The part of the reflector which comes down into the centre of the globe, inclosing the gas-way, tends greatly to change the appearance of the lamp.

The arrangements for the suspension, supply of gas and its control, etc., are the same in all these lamps.

The supply pipe runs along the roof, an outlet being taken off at intervals as required. The lamps are suspended directly from the roof proper, being stiffened in their position by means of lock nuts on the upper and lower side of the roof boards. The gas passes down one of the suspension arms, being controlled on its way to the burner by the cock (*R*) shown. The globe is set in a bezel, which is hinged at one side and held up by a snap spring at the opposite side.

The Erie Railroad has for the greater part introduced the duplex lamp described, using four lamps to a car, with a small coal oil lamp in the saloon. The duplex lamps are reported to consume a little less than two feet per hour per lamp, which makes the total consumption for the car less than 8½ ft. per hour. It is said that this gas is now costing the Erie company $2 per 1,000 ft. compressed. It is claimed that this price will be considerably lowered as the consumption increases and the men become more familiar with their work. At $2 per 1,000, the cost per hour for lighting the car is 1.7 cents. For the month of December on this road the cost for gas per car averaged $8. On these cars every passenger can read his newspaper with ease.

On the Erie, in addition to the passenger, baggage and express cars, all the mail cars have been equipped for the Pintsch system. Special brackets and shades are used so as to place the light exactly where it will do the most good The mail clerks—a class hard to satisfy as they have to read written addresses in the car, are unanimous in the opinion that it is the light they require.

The New York West Shore & Buffalo Railroad Company have also adopted this light, and as it desires a *brilliant* effect it has decided to place in each car five lamps of the duplex pattern, but furnished with four burners, the total consumption per hour for the four burners to be 2¾ ft.; making the total consumption per hour for the car 13¾ ft.; which, taking the price per thousand at $2, will make the cost per hour for lighting the car 2¾ cents. In the West Shore & Buffalo cars no special provision will be made for lighting the saloons. The upper parts of the partitions will be furnished with ground glass, which, owing to the brilliant illumination of the main part of the car, will admit sufficient light into the saloons.

The Pintsch system of lighting cars is the invention of Julius Pintsch, of Berlin, Germany, and was first introduced on European railroads in 1870. Since that time it has been introduced on the railroads of nearly every country in Europe, and the rapid rate at which it has been adopted is indicated by the following table:

Commencing the year 1870, it took until 1873 to reach 175 cars.

Year.	Cars.	Year.	Cars.
1874 about	400	1879 about	4.700
1875 "	650	1880 "	6.100
1876 "	1,100	1881 "	8.000
1877 not quite	2.000	1882 "	10.400
1878 about	3.200	Now nearly	11.000

Its introduction into this country has been more recent, and therefore much less extensive than in Europe. There are, however, now five cars lighted by this system on the New York, Providence & Boston Railroad, 100 on the New York Lake Erie & Western, and 82 under contract for the New York, West Shore & Buffalo road.

The agent for its introduction in this country is the Pintsch Lighting Co., No. 19 William street, New York.

Tire Sections and Rail Sections.

On March 11, 1881, we published a short article on "The Flanges of Leading-wheel Tires," and gave full-size sections—reproduced in Fig. 1—of the flanges used by five of our leading railways. This article seems to have attracted the notice of Herr Wöhler, the well-known German experimentalist; and in the *Centralblatt der Bau-verwaltung* for Aug. 20, 1881, issued by the Minister of Public Works, Berlin, he published a paper with substantially the same title as that with which we have headed this article. He begins by referring to a remark in *The Engineer* with respect to the material difference between the tire sections used on different railways, and observes that the same diversity exists in Germany. When the German Railway Union collected statistics on the subject, 12 different sections were submitted, coming from 34 different railways, and the radii to which the fillets, or curves between the flange and the tread, were struck varied from 14 to 29 mm. (0.55 in. to 1.14 in.)

It is evident that the continual wear between the flange of the tire and the head of the rail must tend, more or less, to bring the shape of the two into correspondence. If they be made of materials different in hardness, the softer of the two will assume the shape of the harder; but if the hardness is about the same, something like a compromise will be arrived at. Again, the greater the area in contact at any moment the less will be the unit pressure, and the less consequently the wear and tear. Hence it would seem at first sight correct to make the tire and rail sections exactly similar to each other; and this would indeed be all that is needed, if a railway were a perfectly straight and even line. But the effect of curves introduces a new element into the question. In the first place, the tread of a tire is not turned to a cylinder, as would appear natural, but to the frustrum of a cone. This, indeed, is not resorted to purely on account of curves. Even on the straight, accidental inequalities, making use of the necessary play between tires and rails, may throw a pair of wheels to one side, thus causing uneven going, and allowing one of the flanges to grind against the side of the rail-head. If the wheels are cylindrical there is nothing to counteract this evil; but if they are conical, the axle is canted upward, and the cones, rolling in a curvilinear line on the rails, bring back the wheels to a symmetrical position. It is on curves, however, that the chief advantage is claimed for the conical form: since by that means the outside wheel, which has the greater distance to traverse, is also made to revolve on a larger circle of contact, so that the speed of revolution is approximately equalized, and the grinding of the outside wheel on the rail is prevented. In Germany the coning of tires appears to be universal, and the slope of the tread varies from 1 in 20 to 1 in 15, or, in the single case of the Saxon railways, 1 in 13.

It is singular that, with all our experience in railways, any doubt should yet remain on such a question as this. Yet, at a recent meeting of the Institution of Mechanical Engineers—"Proceedings, 1880," p. 71—Mr. Crampton laid down the dictum that coning was an entire mistake, and further stated that Mr. Haswell, of Vienna, having at his suggestion adopted the cylindrical form, had found this produce a saving in wear and tear of tires of not less than 20 per cent. It was stated in the same discussion that Mr. Charles Brown, of Winterthur, now makes all his tramway engines—in which department he has great experience—with cylindrical wheels. Mr. Crampton's theory is that, when a vehicle is on a curve, it is only in the front pair of wheels that the tire flange is grinding against the rail. If this were true, the difficulty could be obviated, in the case of engines by coning the leading wheels and not the trailing ones; but as a matter of fact it is not true. Our fig. 2 shows, of course with great exaggeration, the passage of a rigid four-wheeled truck round a sharp curve. It is clear that the outside leading wheel *A*, on which the main stress comes, will strive to put itself in the direction of a tangent to the curve at its point of contact, but that, if it did so, it would throw the outside trailing wheel *D* beyond the outer rail altogether. All that it can do, therefore, is to keep the flange of *D* pressed up against the inside of the outer rail, exactly as is its own flange, and, therefore, if coning is of any advantage for the one pair, it will be for the other pair also. As far as curves are concerned, therefore, the value set upon coning would appear to be well founded. With regard to its action on the straight, Herr Wöhler states that several railways have increased the angle of coning of their wheels, specially to give more even going on the straight, and have derived benefit therefrom. It would seem, therefore, that both experience and theory point, on the whole, to the coning of wheels as the true course to adopt, while at the same time the adverse verdicts of Mr. Haswell, Mr. Brown, and others, seem to show that there is still something in the matter which requires further and closer investigation.

With regard to the proper angle of coning, Herr Wöhler considers that it should not be too great, otherwise when in the straight a wheel gets accidentally to one side, the inequality in the circumferences of contact may cause serious grinding before the conical form brings it back to the symmetrical position. He also points out that with rigid axles the coning is quite incompetent to prevent what is probably the worst wearing effect upon curves, namely, that due to the axle not being normal to the rails. The wear thus brought upon the flange requires, as he observed, a close investigation. On the whole Germans appear to prefer 1 in 20 to any other inclination or coning for the tire. This is used for the flange section shown in fig. 3, which is that agreed upon by the state railways of Prussia, and by several other German companies. Here the fillet of the flange has a radius of 15 mm., while that of the rail head curve is 13 to 14 mm. The result is that after a very short time the flange and rail get to an exact fit, and in passing round curves the wear is equally divided between the two.

In fig. 4 are shown sections of tires, taken before and after wear, from two engines, having this flange section, the rail head being as in the shaded section. The effect of the mutual action of the two in producing lateral wear is well illustrated, and also its very unfavorable results for the duration of the tire, owing to the great thickness of material which has to be removed in turning down to bring the flange back to its original section. The thickness thus wasted in the leading wheels is at least three times that removed by direct wear; and this thickness will be greater the nearer the original slope of the flange was to the vertical, assuming the depth of wear to be the same. There is no doubt an equal wear upon the rail heads, but as this is distributed over a great length of way, it is not so visible.

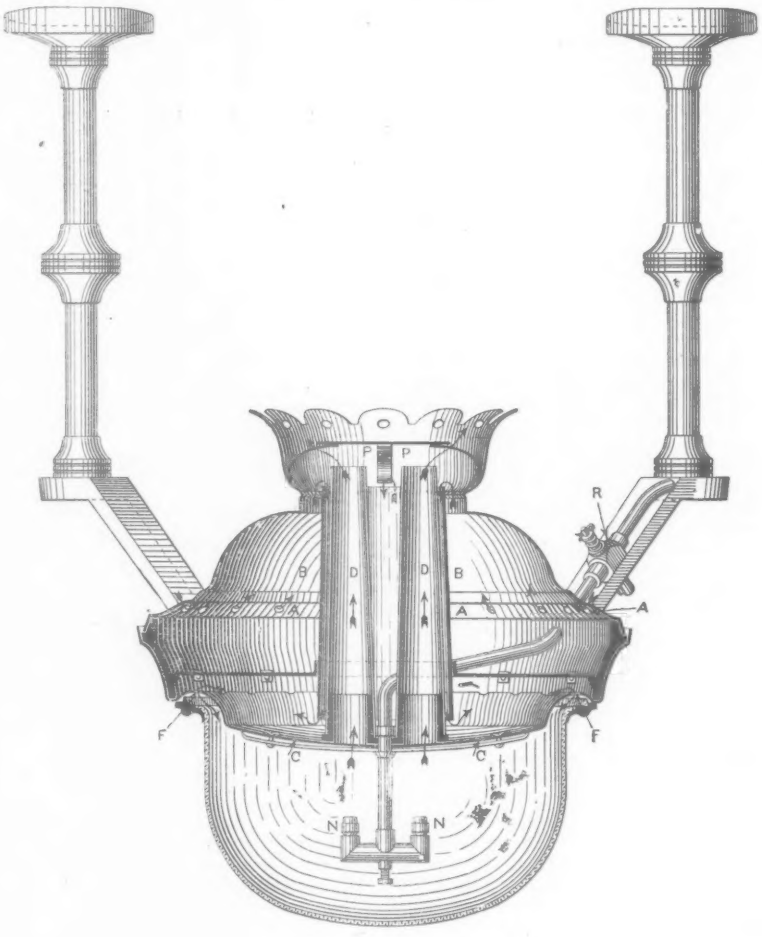


Fig. 8.

PINTSCH LAMP.

We have now to consider whether this section can be improved. What is needed is to add to the coning—which is apparently all which is needed for the conditions of the straight track—some additional improvement in section which shall respond to the conditions on curves. Herr Wöhler's way of dealing with the problem is as follows: An obvious suggestion, he remarks, is that represented in fig. 5, namely, to terminate the ordinary inclination of the tread toward the flange by a short slope *A B* at a much higher angle, here taken as 1 in 4. In that case, when the leading wheels entered a curve, and the flange of the outer wheel began to approach the inside of the rail, the rise of the wheel on the rail would be so marked as alone to compensate for the increased distance this wheel has to travel, and also to give a sideways pressure sufficient to guide the wheel round the curve, without the actual edge of the flange *B C* coming in contact with the rail at all. This simple arrangement would require, however, a similar sloping off of the rail head, as represented in fig. 5, otherwise the wear would be so concentrated as to be excessive. It is, therefore, inapplicable to the present rounded form of head. The principle may, however, be adapted to that form by giving the fillet *A B* a much larger radius than is now usual, as shown in fig. 6. The wheel, as it enters a curve, will then mount upon the rail much as before; and the tangent drawn at *C*, fig. 6, shows the virtual slope thereby given to the circumference of contact, which, as will be seen, is quite as steep as that shown in fig. 5. The higher the wheel mounts the steeper will this slope become, and therefore the more powerful will be the sideways thrust tending to push the wheel back again and to guide it round the curve. This Herr Wöhler offers as a satisfactory solution of the problem; and it remains to ask whether it may really be accepted as such.

The amount by which the wheel will rise on the rail can be easily calculated in any particular case, of which the condi-

tions are known. Let O be the centre from which the curve of the tire section is struck, and let i be the angle which the radius $O\,C$, fig. 6, makes with the vertical. Let W be the weight on the wheel, f the coefficient of friction between wheel and rail, P the normal pressure along $O\,C$ and T the horizontal thrust. Then, resolving vertically and horizontally,

$$P\cos.\ i - f\,P\sin.\ i = W$$
$$P\sin.\ i + f\,P\cos.\ i = T.$$

Hence,

$$W\,\frac{\sin.\ i + f\cos.\ i}{\cos.\ i - f\sin.\ i}$$

is clearly the net sideways thrust—allowing for friction—which guides the wheel around the curve. Let $n\ W$ be the total weight of the vehicle—so that $n = 4$, in the case of an ordinary four-wheeled truck—v its velocity, and r the radius of the curve. Then, the sideways thrust found above has to counteract the centrifugal force due to the passage of the weight $n\ W$, at velocity v, round a curve of radius r. The resulting equation will thus be

$$\frac{\sin.\ i + f\cos.\ i}{\cos.\ i - f\sin.\ i} = \frac{n}{g}\,\frac{v^2}{r}$$

from which the value of i can easily be found.

It will be well to test the effect of this arrangement in a particular case. Let us suppose that $r = 1000$ ft., that $f = .15$, and that $n = 4$. Then the equation is

$$\frac{\tan.\ i + \cdot 15}{1 - \cdot 15\tan.\ i} = \frac{4\ v^2}{32{,}200}$$

Suppose $i = 45$ deg., then tan. $i = 1$, and we have—

$$v^2 = \frac{32{,}200}{4} \times \frac{1.15}{.85}, \text{ or } v = 105.$$

Hence it appears that a velocity of 105 ft. per second, or about 70 miles an hour, would be sufficient to make the wheel mount on the rail until the angle made by $C\ O$ with the vertical was not less than 45 deg., so that C assumes the new position C^1. But at this angle it will be seen that the distance of C^1 from the horizontal $A\ D$—in other words, the difference between the radii of the circles of contact in the two wheels—is not less than ¼ in. Assuming the wheels to be 3 ft. 3 in. diameter, this makes the ratio between the distances traveled by the two wheels in each revolution—supposing there is no slipping—to be $\frac{39.5}{39}$ or 1·013. But the ratio between the lengths of the outer and inner rail, on a curve of 1,000 ft. radius-assuming the standard gauge—is $\frac{1004.7}{1000}$ or 1.0047 only. The effect due to the mounting of the wheel in this case is therefore shown to be nearly three times as great as is required to make the two wheels run round the curve; and the grinding will therefore be much worse than if the circles of contact were simply allowed to remain the same. Moreover, as will be seen by fig. 6, the fillet at the point C, is just about to merge into the general slope of the inside of the flange, and any advantage as to wear, due to its presence, is therefore reduced to insignificance.

It would, therefore, appear that Herr Wöhler has neglected to examine the true effect of his suggestion, when he proposed this very wide fillet between the tread and flange of the tire. He may possibly object that 70 miles an hour is beyond the speed even of express trains, but it must be remembered on the other side that many lines have curves with radii less than 1,000 ft. The conclusion remains, therefore, that the large fillet here suggested does not produce the amount of sideways thrust that is required to guide an engine round a curve under ordinary conditions, and that if it did it would be at the expense of so much grinding, due to the inequality in diameter of the wheels, as probably to neutralize its advantages in other respects.

It would seem, therefore, that it is imposible by any variation of tire section to prevent, in passing round curves, the ordinary contact between the inside of the flange and the side of the rail head, with all the consequences of wear which must inevitably follow. All that we can do, therefore, is to see that the evil effects of this wear are reduced to a minimum, and for this purpose its exact nature and conditions must be studied. Here Herr Wöhler again comes to our aid by a careful investigation of the question, which may be condensed as follows: In the first place, it is an accepted fact that under similar conditions the wear is greater as the pressure per unit of surface in contact is less. Thus, where a plain surface is in contact with a round one—fig. 7—the wear will be greater as the radius of the circle is less. Again, if two rounded surfaces are in contact—fig. 8—the wear will be less as the radii of the two approach to equality. It is easy to establish a relation between the two cases. Thus, let r and r^1 be the radii, say, of the rail head and tire section respectively, and R the radius of the circle which, if in contact with a plane, would have the same length of arc in contact as there is between rail and tire. Then, by the ordinary rules of curvature,

$$R = \frac{r^1\ r}{r^1 - r}.$$

Now, in the direction of motion the rail is straight, whereas the tire is circular, and this makes a great difference in the pressure per unit of surface in contact. This pressure does not vary inversely as R, but in a much smaller ratio, which according to Herr Wöhler, is about as the fourth power of R inversely. Again, where the pressure per unit of surface is so high as in this case, and where there is always a certain amount of slipping, the wear will not vary directly as the pressure, but probably in a higher proportion. Thus everything points to the desirability of making R as great as possible.

Now, if we suppose the curvature of the rail head and the tire fillet to start from the same point of contact A, fig. 9, the difference between their radii will be fixed by the play which it is decided to allow between the tire and the rail. Let this fixed difference be e; then we have

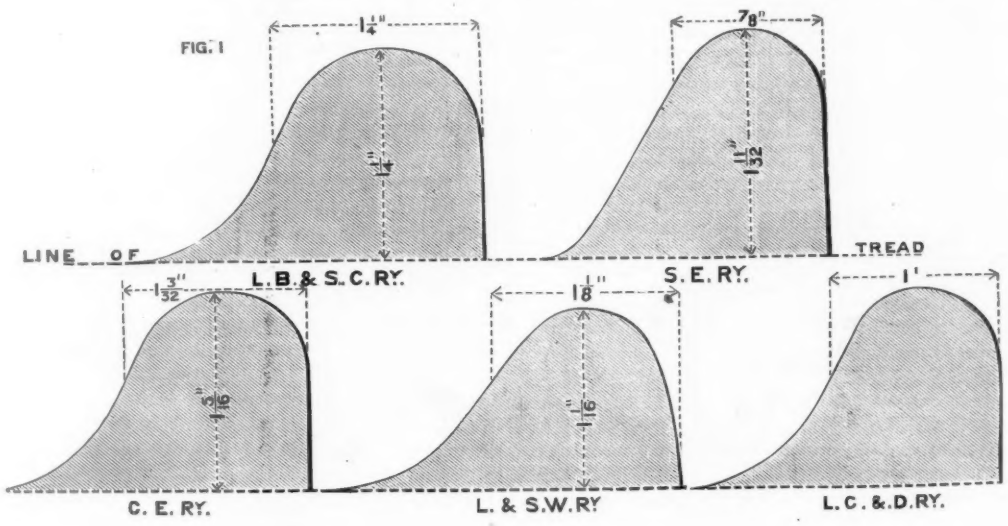
$$R = \frac{(r + e)\ r}{e}$$

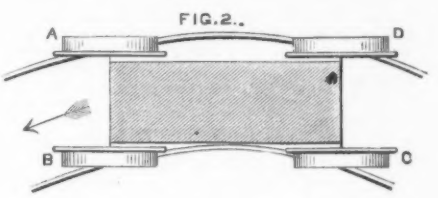
Hence R will be greater as r is greater; in other words, the wear will be less as the radius to which the rail head is rounded is greater.

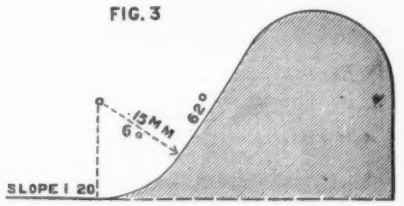
On German railways the established radius for the rail head is 14 mm. (0.55 in.), and the total play between rail and tire—or the difference in the gauge—must not be less than 10 mm. (.39 in.) or more than 25 mm. (.98 in.). This gives .2 in. and .5 in. as the limits of the play at each rail. We must not make e so great that the superior limit of this play shall be reached by a slight amount of wear; but short of this it should be as large as possible, because this enables us to give the largest possible value to r^1, the radius of the flange. This is based, however, upon Herr Wöhler's view that a large value for this radius is desirable—a view which we have shown above to be at best doubtful. On the whole he considers that a radius of 28 mm. (1.1 in.), or double that of the rail head, is the best for the flange. This is represented in fig. 9. It merges into the general slope of the flange, which is about 60 deg.; this he states, is the best angle for an ordinary four-wheeled goods wagon, with a rigid frame, passing round a curve of 1,000 ft. radius. On the same figure is marked in dotted lines the outline of the London & Southwestern section taken from fig. 1, and it will be seen that they are very closely coincident. Still following his leading idea, Herr Wöhler suggests that this might yet be improved by giving the fillet, from its junction with the flange, a much larger radius—37.3 mm.—and then uniting it with the tread—which it would meet at a slope of about 1 in 5—by a short arc of the same radius as the rail head. This section is represented in fig. 10.

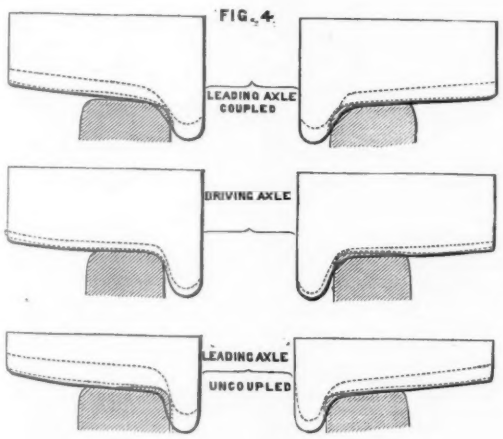
A yet further improvement might be effected, he considers, by a change in the rounding of the rail head making it start from the tread with a radius of 22 mm. (.87 in.), and merge into the side with a radius of 12 mm. (.47 in.). This, as shown in fig. 11, would not alter either the width of the rail or the area of the tread, but the value of R may thereby be increased from 28 mm. to 56.5 mm. in the section shown, fig. 9, and from 22.4 mm. to 42.8 mm. in the section shown, fig. 10. Herr Wöhler concludes his paper by urging the importance of the subject, not only with regard to fixed, but also to radial axles, the full advantage of which will never be realized until the section of the flanges and rails is so proportioned as to reduce to the minimum the wear which accrues from the different distances which the two wheels have to traverse.

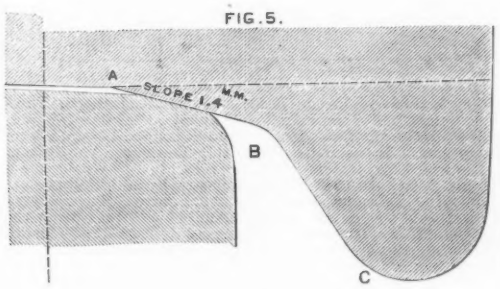
While fully agreeing with Herr Wöhler in his principles, we are bound to dissent from his practical conclusions. We have already shown that the very large radius of fillet which he recommends does not really fulfill the purposes for which it was intended; and even if it did, it has the fatal defect of diminishing the very element which should be the largest, namely, the surface of contact. Let us, therefore, make an effort to determine independently what the best section for the flange of a tire is likely to be. It is evident that there are three main questions to be decided: first the slope or angle of inclination to the horizontal of the inside face of the flange; secondly, the form of the curve or fillet, by which this slope is made to merge into the tread of the tire; and thirdly, the inclination of this tread itself to the horizontal—in other words, the coning of the wheels.

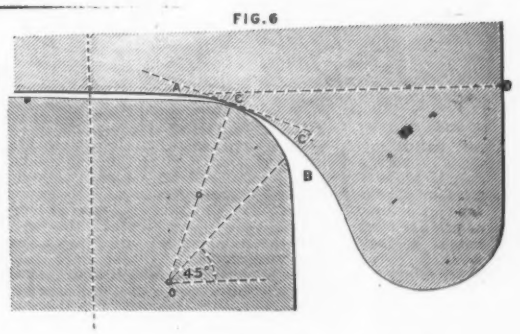












With regard to the first, or the inclination of the flange, it has been correctly pointed out that the nearer this approach to the horizontal the less will be the thickness of tread which will have to be turned off—after a given amount of lateral wear—in order that the re-turned tire may have the same section of flange as it had when new. It may be asked, why is this condition necessary? The tread of the tire is necessarily much thinner, after re-turning, than it was originally; and why should not the flange be made thinner also? The answer is that the stresses tending to tear a tire apart through the tread are not, or ought not to be, severe; and that if a tread has evinced sufficient toughness to come back uninjured to the shop for re-turning, it may be reduced very greatly in thickness before there is any risk of its parting. As a matter of fact, we believe that the cases of such parting occur very rarely indeed with old and re-turned tires; they are almost always with comparatively new tires, which have been somehow made too hard. On the other hand, the stresses and shocks to which tire flanges are subjected by the sideways action of vehicles, particularly on sharp curves and in passing over points, are most severe, and always require a very large allowance of strength. Moreover, the results of failure in the former case are much less to be feared than in the latter. Wheels with cracked tires, if these are properly secured, have run for many miles, even hundreds of miles, with safety; but a wheel from which a portion of a tire-flange has flown off is certain to "jump the rail" almost immediately, and thereby to bring about an accident more or less severe. We think, therefore, that engineers are right to insist on keeping up the full thickness of their tire flanges; and, this being so, it follows, as mentioned above, that the slope of the flange face to the horizontal should be as small as possible. On the other hand, it clearly must not be so small as to cause any danger that a vehicle, when entering a sharp curve at a high speed, may mount too far,

and actually pass over the rail. This limit, therefore, has to be fixed. Now, if we recur to our previous investigation as to the sideways thrust due to the pressure of the flange upon the rail an angle i, we shall see that if cos. $i - f$ sin. i is zero, then the value of this thrust is infinite—in other words, the flange would not rise over the rail, even if the velocity were indefinitely great, or the radius of the curve indefinitely small. If, as before, we take $f = .15$, this gives a value for i of 81½ deg.; in other words, a slope of this steepness would make it absolutely impossible for a wheel to mount, even under such conditions. It is obvious that in practice a much lower angle will be admissible. If we assume that $i = 60$ deg., we shall find that the speed required to make the wheel mount against such an inclination on a curve of 1,000 ft. radius is about 100 miles an hour. This would appear sufficient to allow, especially as, in such extreme cases, the coefficient of friction would no doubt rise above the low value of .15, which we have assumed for it; and it appears that this is about the angle which experience has shown to be the best. Roughly measured, the angles of slope for the various sections figured in this article are as follows: London, Brighton, & South Coast Railway, 66 deg.; Great Eastern Railway, 66 deg.; Southeastern Railway, 58 deg.; London & Southwestern Railway, 55 deg.; London, Chatham & Dover Railway, 63 deg.; German State Railway—fig. 3—62 deg.; Herr Wöhler's section—fig. 9—63 deg. It will be seen that the engineers of the London & Southwestern Railway are content with an angle of 55 deg.; and we may fairly assume this to be sufficient, unless, perhaps, in the case of express engines running on a line with sharp curves, for which 60 deg. or 65 deg. would seem perhaps to be safer.

We come, secondly, to the curve uniting this slope with the tread. This must be taken in conjunction with the curve of the rail head. We have already given our reasons for dissenting from Herr Wöhler's conclusion, that the radius of the curve in the flange should be much larger than that in the rail. On the contrary, we much prefer the system adopted by the German railways, in which the flange radius is made just a little larger than the rail radius to start with, so that a little wear brings them to a good fit. On the other hand, we agree in his view that the rail radius should be made as large as possible, since this tends to increase the area in contact; but this change can only be made slowly, as lines are re-laid, and meanwhile the tires must be adjusted to the existing curves. The importance of making the surface exposed to lateral wear as large as possible is sufficiently shown in fig. 4, where the great extent of the lateral wear, as compared with the vertical wear on the tread, is very remarkable. On the other hand, a rail is never taken up on account of lateral wear, but always because of scaling and abrasion on the top. It would seem desirable, therefore, that the rail should be harder than the tread of the tire, but softer than the flange. Where both are of steel, this could only be accomplished by means of some system of case-hardening; but we are not aware that any experiments have been tried in that direction.

Thirdly, we have to consider the coning or inclination of the tread. We have already seen that with a standard gauge, and a curve of 1,000 ft. radius, the difference between the diameters of the circles of contact in the two wheels should be .0047 of the diameter, or, say, for ordinary diameters, .18 in. Since the shifting laterally of the wheels decreases the contact circle of the one as much as it increases that of the other, we must divide this by 4 to get the actual increase or decrease of the radius, which has to be provided by the effect of the coning, which will thus be .045. If the slope of the tread be 1 in 20, it will require a lateral shifting of about .9 in. to give this amount of elevation or depression. This is very nearly equal to the extreme limit of play allowed between wheels and rails; and therefore it would seem better to adopt the slope of 1 in 15, which, with a lateral play of about ½ in., would seem to answer well to the radius of curves most commonly met with on first-class lines.

The tire section thus arrived is shown in fig. 12 in its symmetrical position, and as arranged for the rail section of the German railways, and thus made comparable with the section recommended by Herr Wöhler, and that used by the London & Northwestern Railway, as shown in fig. 9. It will be seen that it differs from these mainly in having a much smaller radius to be fillet of the flange. This radius is, however, not far from being a mean of the radii used by the five railways represented in fig. 1; and it is to be presumed that even the very small radius of the Southeastern Railway has not been found to yield any disastrous results in practice.

We will conclude by two practical remarks. The first is that the necessity and severity of the lateral wear on the flanges of tires, as here considered, points clearly to the advantage which would arise from lubricating these flanges in the case of the leading wheels of engines. It is well known that such lubrication has come largely into use on German lines, and with most successful results, the lubricants used being grease, petroleum, or sometimes even hot water. No difficulty seems to have been found from the wheels slipping, and the gain in durability of tires is said to amount to 50 per cent. It seems a pity that no such experiments have been made in this country; but it may be questioned whether in such a case the angle of the flange should not be increased somewhat, say from 55 deg. to 65 deg. The other remark is as to the means of testing the various forms of section used, or proposed, as to which is really the most favorable for durability. There would seem be a very simple method of doing this, without waiting for the tardy and always intricate results of actual experience in working. Let several wagons be prepared alike in weight, state of lubrication, material of tires, etc., but with the flanges made each to one of the sections proposed to be tested. Let these wagons be launched successively at the same speed upon some sharp curve. The speed should be high enough to approach to the conditions of practice. Then the wagon which ran furthest round the curve before coming to a standstill would clearly be running with the least resistance; and as decreased resistance means decreased wear and tear, it would be tolerably safe to assume that the same wagon would show the best mileage record when it came into the shop to have its tires re-turned.—*The Engineer.*

A Pullman Train from Calais to Rome.

All roads lead to Rome, but never until a few days ago did a Pullman palace car travel on any of them. The first Pullman special train for Rome left Calais on Friday, 23d ult., shortly after 2 o'clock, and it reached Rome on Sunday an hour and a half ahead of time, after traveling 1,400 miles without being a minute late at any of the stations at which it was booked to stop. The three palace cars, "Australia," "Castalia" and "Germania," were built at Detroit, and put together and furnished at Derby, so the longest continuous trip ever made in Europe may fairly be termed an Anglo-American enterprise. These cars are destined to run continuously between Rome, Naples and Reggio, and as they had to be taken to Rome, Mr. H. S. Roberts, European manager of the Pullman Company, determined, if possible, to run the three cars through as a special train, taking any passengers who cared to go *à la* Pullman. The difficulties which Mr. Roberts had to contend with were exceedingly great. In the first place, it was by no means certain that the Pullmans, which are much larger than ordinary carriages, would go through some of the tunnels on the Italian lines. It would have caused considerable annoyance if, when the train was going at 50 miles an hour, it was suddenly discovered that the particular tunnel through which it was going was too small. Trivial as such incidents may seem to an outsider, they have to be taken into account by the careful railroad man. No right-minded person desires to smash up other people's tunnels. If there is anything an Italian railway manager loves, it is a nice tunnel. Along the Appennines there is a tunnel every few rods. There are tunnels of all sizes, from the seven miles Mount Cenis, to the one which is like a flash of black lightning. The most captious person could find no fault with the assortment of tunnels these enterprising Italians provide for their patrons. Tunnels come high, especially those at the tops of the mountain, but the Hightalians must have them, and consequently they would object to having any of the inside frescoing taken off by a Pullman train. Another matter for consideration was the curves. The long Pullman car does not particularly like a short curve. History tells us that once when a bridge over a Swiss chasm was thought to be unsafe, the Highpandrum of the canton hit on a happy method of testing its stability. He got all the people the bridge would carry to stand on it, and as it did not go down it was pronounced safe. In like manner Mr. Roberts might have swung his train around the curves, and if it did not break or run off the track, the curve question might have been dismissed. However, he did not adopt this enterprising method, but took the slower plan of going over the ground and making measurements and calculations, and finally it was agreed that the Pullman would go over the road without straightening a curve or taking any of the decorations off a tunnel.

There were other difficulties in the way that required some diplomacy to get over. The officials of some of the foreign railways were at first averse to allowing any person to run a special passenger train over their roads. But at last all obstacles were overcome, and Mr. Roberts turned his whole attention toward getting everything in perfect order for the trip. The cars were taken over from London to Calais by steamer, and placed on the rails in readiness a few days before the start was made. The weather throughout the trip was all that could be desired. The passengers were mostly from England, several gentlemen having their wives with them, and to these were assigned the private state-rooms with which each car is provided. By general consent the centre Pullman was used as a smoking car, although each car contains a smoking room.

The train consisted of the engine, a luggage-van, and three Pullmans, another luggage-van, and last a sort of guard's car. It left Calais at about 2:30 on the 23d, after having been an object of great curiosity to a large crowd of sight-seers, who collected at the station and along the railway. M. Thouin and M. Delebeque, of the Northern of France Railway, came on at Calais. At Boulogne, which was reached in about three-quarters of an hour, the other officials joined the train, while a number more got on board at Amiens. When Paris was reached, the train was taken over part of the Circular Railway to the Lyons station, where all got out, at 8:40, to demolish a dinner that had been telegraphed for. If the passengers had any money left with which to continue their journey, it must have been through some oversight on the part of the person who runs the restaurant. He certainly made a vigorous effort to scoop in the wealth of the crowd. Shortly after Paris was left the cars were quickly transformed from day to night coaches. Many of the railway officials left at Paris, but others joined, so the number in the train was always about the same.

Among those who got on at Paris were M. Hottinger and M. de Varu, directors of the Nord Railway; M. Meissonier, the Railway Superintendent of the Public Works in France, and M. Banderail, Locomotive Superintendent of the Northern of France, together with M. Noblemaire, General Manager; M. Picard, Traffic Manager, and M. Henri, Locomotive Superintendent, all of the Lyons Railway.

A stop of a few minutes was made at Dijon at 5 in the morning, and again at Macon for a cup of coffee. The engineer of the locomotive, who was interviewed here as to how he found the cars run, said that he was never in charge of a train that behaved so well. He seemed to think that with ordinary care the Pullmans might be taught to run alone. At Culoz, among the snow-covered mountains, a stop was made at 10:36 for breakfast; after this meal the delighted passengers desired the Detroit *Free Press* to announce to the world that a Culoz breakfast stands

FIG. 7.

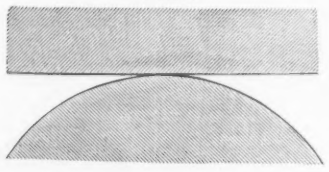


FIG. 8.

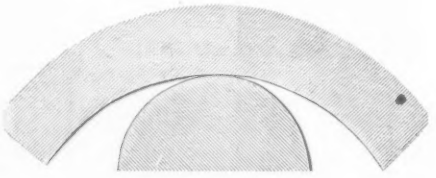


FIG. 9

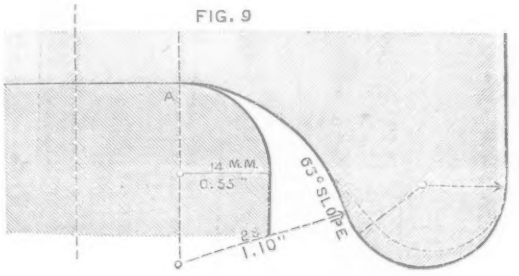


FIG.10

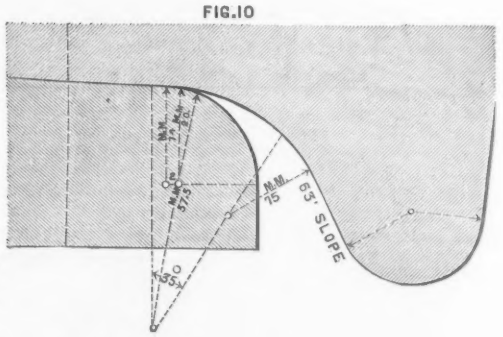


FIG.11

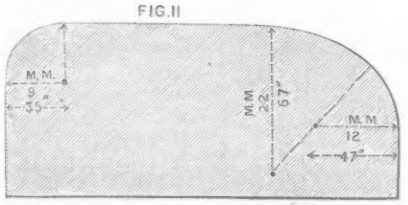
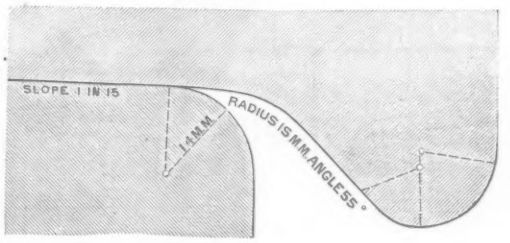


FIG. 12



At Modane, M. Bachelet, Traffic Superintendent of the Alta Italia Railroad, came aboard. Old "Hannibal" took us through the depths of the Mont Cenis Tunnel in 26 minutes, and at 9:20 Saturday night the train passed into the great glass arch of the Turin railway station, "the largest station in the world"—a distinction which it shares with about a score of other stations.

Here President Blumenthal and Assistant General Manager Ratti, of the Alta Italia Railroad, joined the party.

After leaving Turin we once more "pitched our moving tent a day's march nearer Rome," and everybody said next morning that they never slept better in their lives.

Sunday morning found the train rattling along among the Apennines. While in the Alps the sleighing had been excellent, if there had been any one with sleighs to enjoy it, but in the Apennines there was not much snow, except at the extreme tops of the mountains.

Manager Roberts had based his calculation on clear tunnels, and he was therefore appalled to find on the top of the Apennines that one tunnel was under repair, and was almost filled with timber arching, leaving just enough room for the ordinary train to pass. Here was a "go," or rather, it threatened to be no go. After a great deal of slow and cautious work, the train was at last got through, although if the tunnel had not been a short and straight one there might have been a stick, as the long cars could not have turned in a crooked timbered tunnel. At Bologna a few minutes were allowed in order that sausages might be obtained, and Florence was reached at 10. After this the course lay along the Arno, and doubtless the anxious manager, who at last freed his mind from fears of "hot boxes" or timbered tunnels, thought "after this there Arno more troubles from here to Rome." It was for making this pun that Julius Caesar was slain, and that was why no jury could be got to convict the murderers.

Mr. Willing, the celebrated advertising contractor of Lon-

don, was a passenger, and he had with him a great quantity of gilded advertising medals that looked like sovereigns. For once the Italian beggars along the route found a man as Willing to give as they were to receive. With liberal hand he flung the yellow tokens among the crowds and the scramblings that ensued were some of the most stirring scenes of the trip.

The dome of St. Peter's was sighted just as the last rays of the setting sun shone on it, and soon the whole city appeared to the travelers. Be it ever so gorgeous there is no place like Rome. The train reached the station more than an hour and a half ahead of time. Among those assembled to see it arrive was Monsignore Capel, who occupies such a prominent position in Disraeli's novel of "Lothair." He warmly congratulated Mr. Roberts on his success in bringing through the first Pullman train to Rome. The run was the longest continuous trip ever made by a train in Europe. The speed averaged about 30 miles an hour, exclusive of stops. The cars will now run regularly between Rome, Naples and Reggio.

This rough sketch is written in Rome, and is hurried through in order to catch the English and American mail. The writer reserves all rights to return to the subject and give in detail some of the incidents of the trip.—*Correspondence Detroit Free Press.*

THE SCRAP HEAP.

Mixed Conversation.

A woman who got aboard the eastern-bound train on the Detroit, Lansing & Northern at Howell the other day was accompanied by a big dog, and after the train had moved out a passenger walked back to the stove and asked of three or four young men sitting around there:

"Can any of you talk to a deaf and dumb person by signs?"

"I can, though I am out of practice," replied one.

"Very well; I wish you'd go and ask that woman over there if she expects friends to meet her in Detroit."

The young man walked up to her, tapped her on the shoulder to attract attention, and began a series of gyrations with his fingers which attracted the eyes of every passenger in the car. The woman's eyes opened and her jaw fell with astonishment, but after a minute or two she colored up as red as a beet and called out:

"Yes, I've got my dog under the seat, and if you mean that you'll tell the conductor on me I mean that I'll hire some one to pitch you into a snow drift if I have to mortgage my farm!"

The deaf and dumb language chopped off right there.—*Detroit Free Press.*

A Wandering Freight Car.

Some strange stories are told about how freight cars are lost. Captain Arnold, agent of the Cincinnati Southern in this city, yesterday told to a *Commercial Gazette* reporter of the strange "conduct" of one of the freight cars of his road. "On last July," said Mr. Arnold, "I transferred one of our freight cars to the Front street connection track, and ordered it sent across to the east side of the city to be loaded with shavings, and from there it was ordered to be sent back to our own tracks and taken to the shops across the river at Ludlow. The shavings never arrived at the shops, and the whereabouts of the car couldn't be found. The Pan-handle road, upon whose tracks it was to be loaded with shavings, had no record of the car. We supposed it would turn up some time, and not until to-day did we ever hear of it, and where do you suppose it is?"

"Give it up."

"It is in Salt Lake City."

"How did it ever get there?"

"I suppose the trainmen of the Pan-handle took it out through mistake and carried it East. It may have gone first to New York and then through to Salt Lake City. For all I know, it may have been bumming around in California. The roads over which it passed should have reported its mileage to our car accountant, but it seems it was not done."

"Is there no way to tell where the car has been in those nine months?"

"Yes, it can be traced in its wanderings from the road in Salt Lake, which reported the car to us."

"Are such things common among freight cars?"

"They do not occur frequently. I remember when I was with the Louisville & Nashville, I ordered a car load of oil to be sent up to an oil refinery on Front street, and supposed the car was delivered according to orders. It was three months before the car was ever heard of, and then it was in New York City loaded with the same oil it had in it the day I ordered it sent to the parties to whom it was consigned. It went to New York without a way bill, and how it got there without a way bill I never knew."—*Cincinnati Commercial Gazette.*

A Ticket Thief.

Mr. P. J. Flynn, agent at Trinidad, Col., for the Atchison, Topeka & Santa Fe road, recently detected a clerk named Charles Lynch stealing coupon tickets from the office. Lynch was arrested, tried and given one year in the penitentiary.

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the present volume of the *Railroad Gazette:*

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Canadian Government Railroads.

The railroads owned and worked by the Canadian Government include the Intercolonial and the Prince Edwards Island roads. The government also owns the Windsor and other local branches, 38½ miles in all, which are worked by other parties.

INTERCOLONIAL.

The Intercolonial includes the line from Halifax to Point Levis (Quebec) and the branch to St. John, 840 miles in all. Its cost is reported at $39,560,021, or $47,095 per mile. Expenditures on capital account last year were $585,568.

The earnings for the year ending June 30 were as follows:

	1881-82.	1880-81.	Increase.	P.c.
Earnings	$2,079,262	$1,760,394	$318,868	18.1
Expenses	2,069,657	1,759,851	309,806	17.6
Net earnings	$9,605	$543	$9,062	....
Gross earn. per mile	2,475	2,093	382	18.1
Net " "	11	1	10	.. .
Per cent. of expenses	99.5	99.9	.....	....

Up to 1880-81 the line had never earned its working expenses.

The Windsor Branch, which is worked in connection with this line, earned $13,999; the running expenses were $21,053, leaving a deficit of $7,054 for the year.

PRINCE EDWARD ISLAND.

This road, on the island of that name, is of 3 ft. 6 in. gauge, and includes 199 miles of main line and branches; its cost has been $3,467,000, or $17,422 per mile.

The earnings for the year ending June 30 were as follows:

	1881-82.	1880-81.	Increase.	P.c.
Earnings	$137,267	$131,131	$6,136	4 7
Expenses	228,259	203,123	25,136	12.4
Deficit	$90,992	$71,992	$19,000	26.4
Gross earns. per mile	690	659	31	4.7
Per cent. of exps.	166.2	154 9	11.3	....

This road has never earned its running expenses. Its traffic is very light, with not much prospect of increase.

West Virginia Central & Pittsburgh.

This company owns a completed line from Piedmont, Md., to Elk Garden, W. Va., 12½ miles, with an extension in progress as noted below. It also owns several coal properties on the Potomac above the Cumberland Region. The report is for the year ending Sept. 30. The completed road was built in 1881.

For the nine months from Jan. 1 to Sept. 30, the total coal mined and shipped was 172,471 tons. The average profit was 45.7 cents per ton, a good price being obtained on account of the scarcity of Cumberland coal during the strike, which did not extend to this company's mines.

The earnings for the nine months were as follows:

Gross earnings of road ($3,376 per mile)	$42,205.21
Expenses (41.16 per cent.)	17,372.86
Net earnings ($1.987 per mile)	$24,832.35
Profits from sale of coal	77,732.74
Total net receipts	$102,565.09

These earnings were expended on the extension of the line. The road is allowed 20 cents per ton for hauling coal from Elk Garden to Piedmont, a rate of 1.6 cents per ton per mile.

Work on the extension of the road from Shaw, 11 miles from Piedmont, to the Upper Potomac coal fields at Fairfax Stone has been delayed by bad weather. The distance is 36 miles, of which 28 miles are in West Virginia and 8 miles in Maryland, the road crossing the Potomac twice. The two bridges over the river are nearly completed, most of the grading done and about half the track laid. There are no tunnels on the line and only two trestles.

Of the $1,000,000 bonds authorized, $617,000 had been issued on Oct. 1. The road when completed will have 47 miles of main line from Piedmont to Fairfax Stone, and the Elk Garden Branch of 1½ miles.

Sioux City & Pacific.

This company owns a line from Sioux City, Ia., to Fremont, Neb., 107 miles, and leases the Fremont, Elkhorn & Missouri Valley road, 310 miles. The report is for the year ending Dec. 31.

The general account is as follows:

Preferred stock	$169,000
Common stock	1,899,400
First-mortgage bonds	1,628,000
U. S. subsidy bonds and interest	2,991,877
Account and balances, interest, etc	1,194,844
Total	$7,883,131
Road and equipment	$5,991,454
Cash and receivables	378,867
Profit and loss	1,512,810
	7,883,131

The principal of the United States subsidy bonds is $1,628,320, the accrued interest $1,363,567, making a total of $2,991,887.

The earnings and income account were as follows:

Gross earnings		$873,563
Expenses (84.76 per cent.)		740,444
Net earnings		$133,119
Rentals	$97,388	
Interest paid	117,675	
Dividends on preferred stock	11,830	
Interest on subsidy bonds (accrued but not paid)	97,699	
		325,592
Balance, deficit for the year		$192,473

The company is now building a bridge over the Missouri River to connect the sections of its road in Iowa and Nebraska, which have heretofore been connected by a steam ferry.

Bangor & Piscataquis.

This company owns a line from Oldtown, Me., to Blanchard, 63 miles, and its trains use the European and North American tracks from Oldtown to Bangor, 12½ miles.

The controlling interest in the road is owned by the City of Bangor, which has issued its bonds in aid of the road to the amount of $925,000.

The earnings for the year were as follows:

	1882.	1881.	Inc. or Dec.	P.c.
Earnings	$123,664	$104,525	I. $19,139	18.3
Expenses	60,501	60,813	D. 312	0.5
Net earnings	$63,163	$43,712	I. $19,451	44.7
Gross earnings per mile	1,963	1,659	I. 304	18 3
Net " "	1,003	694	I. 309	44.7
Per cent. of expenses	48.91	58.20	D. 9.29	....

From the net earnings the sum of $58,000 was paid over to the city of Bangor towards interest on bonds, $1,804 were expended on surveys for the extension of the road.

Arrangements have been made to begin work on the extension from Blanchard to Moosehead Lake.

New York, Pennsylvania & Ohio.

The report of this company for the year ending Dec. 31 last shows no change in the mileage worked during the year.

The equipment consists of 217 locomotives; 78 passenger, 19 combination, 3 postal and 41 baggage and express cars; 3,520 box, 502 stock, 3,093 flat and coal and 108 caboose cars; 1 private car, 1 pay car and 20 service cars.

The general account, condensed, is as follows:

Common stock		$34,999,350.00
Preferred stock		10,000,000.00
Funded debt		90,871,000.00
Deferred warrants		1,200,077.50
Special fund for additions to property		255,764.91
Bills, accounts and balances		745,154.87
Interest		650,008.52
Profit and loss		2,779.53
Total		$138,724,135.33
Road and property	$136,806,393.86	
Other assets, stocks, etc	344,915.46	
Supplies	346,999.26	
Accounts and balances	460,567.55	
Cash to pay coupons	491,523.52	
Cash	183,735.68	
		138,724,135.33

The funded debt consists of $8,000,000 prior lien bonds, on which interest is payable in cash; $38,371,000 first-mortgage bonds, on which interest is payable in cash as far as earned, any balance in deferred warrants convertible into new bonds; $14,500,000 second-mortgage and $30,000,000 third-mortgage bonds, interest on which is payable only if earned.

The earnings for the year were as follows:

	1882.	1881.	Inc. or Dec.	P.c
Freight	$4,315,028	$4,057,264	I. $257,764	6.4
Passengers	1,316,739	1,247,727	I. 69,012	5.5
Express and mail	127,602	114,925	I. 12,677	11.9
Miscellaneous	71,713	74,196	D. 2,483	3.4
Total	$5,831,082	$5,494,112	I. $336,970	6.1
Expenses	3,838,297	3,864 885	D. 26,588	0.7
Net earnings	$1,992,785	$1,629.227	I. $363,558	22.3
Per cent. of exps	65.82	70 35	D. 4,53	....

The reduction in expenses was secured in spite of the very low rates obtained on through freight during the first half of the year. The increase in freight earnings was due to the large increase in freight tonnage, the gain being chiefly in through business.

The income account is as follows:

Net earnings as above		$1,992.784.54
Interest, dividends, etc		35,259.74
Total		$2,028,044.28
Hire of car-trust cars	$260,346.12	
Use of foreign cars and engines	133,338.50	
Rents	426,851.31	
Taxes and miscellaneous	159.702.11	
		974,238.04
Net surplus		$1,053,806.24
Interest on prior lien bonds	$480,000.00	
Improvements and additions	107,465.57	
Himrod Furnace judgment	84,922.73	
		672,388.30
Net balance for the year		$381,417.94
Surplus Jan 1, 1882		86,426.36
Total		$467,844.30
Dividend on first-mortgage coupon, due Jan. 1 1883		465,064.77
Surplus, Jan. 1, 1883		$2,779.53

The traffic for the year was as follows:

	1882.	1881.	Increase.	P. c.
Freight-car miles	83,899,163	74,528,017	9,371,146	12.6
Passengers carried	1,590,013	1,457,226	132,787	9.4
Passenger-miles	66,125,091	65,982,669	142,422	0.2
Tons freight carried	5,417,362	5,142,679	274,683	5.3
Ton-miles	694,147,402	609,482,972	84,664,430	13.9

Of the freight-car mileage last year 80.13 per cent. was of loaded cars. Of the passenger-mileage 54.95 per cent., and of the ton mileage 83.03 per cent. was of through business. The average rate per passenger-mile through was 1.498 cents; local, 2.592 cents. The rate per ton-mile through was 0.502 cents; local, 1.204 cents.

The coal, ore and oil traffic has been as follows for three years:

	1882.	1881.	1880.
Coal, tons	1,228,952	1,359,759	1,003,141
Ore, tons	542,985	534,159	494,569
Oil, barrels	974,007	933,250	835,556

The oil traffic is very much smaller than it formerly was. In 1879 there were 2,385,752 barrels carried, and in 1877, the best year reported, there were 3,530,188 barrels. The change is largely due to the extension of pipe lines.

In 1882 the coal traffic was made up of 149,338 tons anthracite and 1,079,614 tons bituminous coal; in 1881 it was 192,993 tons anthracite and 1,166,766 tons bituminous coal.

The average receipts per train mile and per unit of traffic were as follows, in cents:

	—Passenger.—		—Freight.—	
Per train-mile:	1882.	1881.	1882.	1881.
Receipt	103.4696	95.0264	89.6205	94.6276
Cost	48.9090	53.0808	65.5407	72.5493
Net	54.5606	41.9396	24.0798	22.2783
Per pass. or ton-mile:				
Receipt	1.9912	1.8909	0.6216	0.6656
Cost	0.9412	1.0564	0.4546	0.5089
Net	1.0500	0.8345	0.1070	0.1567

The average rate per ton-mile for the first half of 1882 was 0.5834 cent, and for the second half 0.6587 cent.

The average rates for ten years have been, in cents:

	Pass.-mile.	Ton-mile.		Pass.-mile.	Ton-mile.
1882	1.991	0.621	1877	2.316	0,908
1881	1.891	0.665	1876	2.023	0.905
1880	2.035	0 831	1875	2.353	0.981
1879	2.105	0.697	1874	2.361	1.186
1878	2.242	0.835	1873	2.545	1.450

The President's report says: "In our last annual report the belief was expressed that there was then a good prospect for the maintenance of paying rates during the year 1882; as will be seen, we were disappointed in this so far as the rates prevailing for the first six months of the year were concerned, while in the last half-year, remunerative though very moderate rates were maintained.

"It will be noted that the freight tonnage for the year shows a considerable increase over the tonnage of the previous year, this notwithstanding the various influences causing a reduction in the total amount of the tonnage of the country and of most railroads employed in east-and-west traffic. This increase is due largely to the effect of the arrangements with the New York, Lake Erie & Western Railroad Co., going into effect Jan. 1, 1882, accompanied by the changes in our Western connections, resulting in a large increase of the percentage of the whole traffic secured to this company's route. The through west-bound tonnage received by this road at Salamanca and delivered to its Western connections was: 1882, 444,520 tons; 1881, 270,079 tons; an increase of 174,441 tons, or 64.5 per cent.

"The tonnage of the whole road was injuriously affected by the strikes in the mining and manufacturing districts served by the road, largely reducing earnings on important portions of the road during a great portion of the year, especially during the summer months."

RAILROAD GAZETTE

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S. WRIGHT DUNNING AND M. N. FORNEY.

EDITORIAL ANNOUNCEMENTS.

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Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subject pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

THE NEW YORK, PENNSYLVANIA & OHIO.

The report of this company for 1882 will be examined with the more interest because of the proposed lease of its property to the New York, Lake Erie & Western. This lease will be submitted for approval to a meeting of bondholders in London April 6, and though it is bitterly opposed by Mr. James McHenry, it will probably be accepted at this meeting.

It is an old story to those who have followed the course of this company that it has always had a hard struggle for existence—an enormous, a ridiculously large capital account, a very moderate traffic at rates always low and sometimes barely covering cost, and not a large local traffic. After the last reorganization the debt on which interest is obligatory was reduced to $8,000,000, and the interest on the $35,000,000 first mortgage bonds is paid in scrip convertible into bond of the same class. In the three years that have elapsed since this arrangement, while the interest due on these first mortgage bonds has amounted to $6,650,000, there has been paid in cash only $816,315. Thus the first mortgage bonds go on increasing at a rapid rate, and it is only in the more prosperous years that the holders of them receive any money. They, however, have the chief interest in the road. The prior lien bonds are supposed to be well covered—though the margin was extremely small in 1881—and the first mortgage bondholders must take the whole of the profits over the rentals and interest on the prior lien, probably, until their bonds mature, as it is unreasonable to expect profits enough to cover the first mortgage interest unless there should be a revolution in the circumstances of Ohio railroads, and a revolution, should it come, is not likely to be in that direction. The tendency is the other way. Properly, the control of the property is now substantially in these first mortgage bondholders, as they choose three of the five voting trustees.

Though this company has had no connections under its control, no capital or credit to obtain them, and but a light traffic originating on its line which it could interchange with connections, it has still been able to command a respectable through traffic, forming, in connection with the Erie, part of a line between the East and Cincinnati, Louisville, St. Louis and Chicago. This was because to all these places except Chicago, it was the only line which the Erie could conveniently use. When the Erie freight lines were taken from Michigan Central and the Lake Shore at the beginning of last year, and the Erie withdrew from the Cleveland, Columbus, Cincinnati & Indianapolis, then nearly the whole of the through freight was concentrated on the Atlantic & Great Western (the exception being that carried over the Canada roads). We have thus last year a concentration of through traffic on the New York, Pennsylvania & Ohio such as it has never had before.

The progress of the traffic on the road we can judge better by comparing it with that of other connections of the trunk lines west of Pittsburgh and Buffalo in 1873 and in each of the last five years. The figures are for *millions* of passenger and ton miles:

	1873.	1878.	1879.	1880.	1881.	1882.
N. Y., Pa. & O.:						
Pass.-miles...	38.9	37.2	43.9	56.0	66.0	66.1
Ton-miles....	276.9	330.7	474.9	474.3	609.5	694.1
C., C., C. & I.:						
Pass.-miles...	27.6	29.5	34.1	40.4	41.7	44.8
Ton-miles...	203.5	276.2	319.7	312.2	371.9	359.5
Lake Shore:						
Pass.-miles...	179.4	133.7	141.2	176.1	208.0	.....
Ton-miles....	1,051.9	1,340.5	1,733.4	1,851.2	2,021.8	.....
Pa. lines:						
Pass.-miles...	254.6	247.3	269.5	321.8	345.4	369.3
Ton-miles....	1,429.4	1,877.6	2,359.3	2,479.5	2,707.8	2,729.8

Now, compared with 1873 and 1879, the percentage of increase of three lines in 1882 was:

	In pass. traffic over		In freight over	
	1873.	1879.	1873.	1879.
N. Y., Pa. & O.	70	50	170	46
C., C., C. & Ind.	62	31	77	12½
Pennsylvania lines.	45	37	91	16

In spite of its disabilities, therefore, the New York, Pennsylvania & Ohio has made a much greater increase in traffic than either of the other roads, and doubtless much greater than the Lake Shore, whose traffic last year is not reported yet, but which had probably less rather than more freight than in 1881, when it was 91 per cent. more than in 1873, and 17 per cent. more than in 1879.

Now this exceptional growth of traffic on the New York, Pennsylvania & Ohio has not been due to its own exertions or resources chiefly, for it has not been in a position to command much traffic; but it has been chiefly due to the Erie, which, recently transformed from a crippled to an effective trunk line, has made extraordinary efforts to get business for its new tracks and rolling stock, and from a large part of the West could not get it conveniently except by using the New York, Pennsylvania & Ohio, and especially so when last year the Vanderbilt roads ordered off its freight lines. Thus a powerful connection on the east has built up its traffic for it. The immediate advantage, however, has not been in proportion to the gain in traffic or anything like it. In the first place, the traffic developed by the Erie was, of course, through traffic, always carried at the lowest prices. In the next place, in the course of developing the new traffic there was probably an exceptional amount of cutting rates, so that this route part of the time received lower through rates than its competitors; and, finally, not wholly without relation to this method of developing traffic, there was a year of railroad war in which most of the time there was no profit whatever on most of the traffic that increased so fast. In all this the New York, Pennsylvania and Ohio has been almost helpless—an intermediate link, like the Great Western of Canada, with no voice in making rates, because by far the greater part of its through traffic was brought to it by connections either east or west of it. Its average freight rates have been among the lowest in the world, and all this gain in traffic has brought it very little profit. Receiving 1.45 cents per ton per mile in 1873, in 1880, when through rates were well maintained, the receipt was but 0.831 cent.; last year but 0.621 cent, against 0.805 on the Erie, 0.730 on the New York Central, and 0.817 on the Pennsylvania. Its nearest neighbor, the Cleveland, Columbus, Cincinnati and Indianapolis, affected largely by the same causes, received 0.706 cent per ton per mile.

The extreme lowness of the average rate on the New York, Pennsylvania & Ohio is due largely to the fact that its traffic is mostly through—the proportion is larger than on any other road that reports through and local separately, which this company does in its last report for eleven years past. We will see below how the freight traffic, rates and earnings have flourished:

Year.	Millions of Ton miles. Local.	Through.	Total.	Cts. per mile.	Freight earnings.
1872	154.3	101.2	255.5	1.496	$3,924,078
1873	136.9	140.0	276.9	1.450	4,016,539
1874	148.5	156.5	305.0	1.186	3,617,524
1875	132.4	167.0	299.4	0.981	2,938,204
1876	114.1	174.3	288.4	0.905	2,611,117
1877	77.0	260.4	337.4	0.908	3,066,408
1878	80.9	249.8	330.7	0.835	2,764,781
1879	120.6	354.2	474.8	0.697	3,310,284
1880	117.4	356.9	474.3	0.831	3,945,494
1881	125.0	484.5	609.5	0.665	4,057,264
1882	118.1	576.0	694.1	0.621	4,315,028

The transformation of the traffic from local to through is something wonderful. In 1872 60 per cent. of the traffic was local. The total traffic grew slowly afterward, but the local traffic grew smaller, until in 1877 it was but half as great as in 1872, while the through traffic was two and a half times greater, and then the local traffic was but 23 per cent of the whole. There was a great increase in both local and through in 1879; but from 1879 to 1882, there has been very little change in local, while the through freight has increased 62½ per cent., and in 1882 the local was but 17 per cent. of the whole. From 1881 to 1882 there was a decrease of nearly 6 per cent. in local, but an increase of 19 per cent. in through freight.

With such an overwhelming proportion of through freight, the rates on which are subject to the whims of a large number of powerful competitors, the weakness and uncertainty of this company's financial position are evident. Five-sixths of its traffic may be made utterly valueless between two days, and sometimes has been so. If there were a rapid growth in local traffic, it might be hoped that the company would in time become independent of through freight; but we see that, though there was a sudden increase of 50 per cent. in the local traffic following the revival of iron and other manufacturing industries after 1878, there has been no growth since, but the local freight was even more in 1879 than in 1882. The part of the traffic which has grown decidedly is the through freight.

This explains why it is that while there has been an increase of 172 per cent. in freight traffic since 1872, this increase of freight earnings has been but 10 per cent., and since 1880, notwithstanding an increase of 46 per cent. in freight traffic, the increase in freight earnings is but 9.4 per cent.

Under the laws of Ohio, if a railroad is leased, the rental must not be less than the net earnings in the year previous to the lease. This and the transfer of the South Shore Line to this road gives especial importance to its business in 1882, and to its earnings and expenses.

Its gross and net earnings and expenses since 1878 have been reported as follows:

Year.	Gross earnings.	Expenses.	P. c. of exps.	Net earnings.
1878	$3,745,207	$2,792,858	79.4	$772,349
1879	4,383,706	3,485,280	79.5	898,426
1880	5,205,357	3,575,269	67.9	1,630,088
1881	5,494,112	3,864,885	70.3	1,629,227
1882	5,831,082	3,838,298	65.8	1,992,784

The working expenses here reported, however, do not include general expenses, balance for use of foreign cars and taxes. By the contract or the lease these will be included in working expenses, as will be a small amount of rents received in the earnings. This would make the net earnings $1,757,055 in 1882, and the expenses 70 per cent. of the earnings; and $1,264,000 of net earnings and expenses 77 per cent. of earnings in 1881. Then $1,757,055 will be the minimum rental payable by the Erie. The maximum percentage of expenses in the lease (68 per cent.) is smaller than any rate at which the road has been worked heretofore, but that, or even 65 per cent., or less, will not be difficult to attain if rates can be kept up to an average of 0.75 to 0.8 cent per ton per mile. There is, however, one new competitor already in the field, to divert even Erie traffic from the New York, Pennsylvania & Ohio, while there is another one and shortly will be two, to divert traffic from the Erie.

On the New York, Pennsylvania & Ohio in 1882, there was an increase of nearly 14 per cent. in freight traffic, compared with 1881, but an increase of only ¼ per cent. in passenger traffic, which is just the reverse of the course of traffic on most other roads similarly situated. The increase in freight earnings, however, was but 6½ per cent., the average rate being lower and a larger proportion of the traffic being through: but the increase in passenger earnings was 5½ per cent., as there was a slight increase in the average passenger rate, and a larger proportion of the passenger traffic was local—the local increasing 3½ per cent., while the through decreased 2 per cent. In gross earnings there was an increase of 6 per cent., and as working expenses decreased ½ per cent., there was an increase of 22½ per cent. in what is given as "net earnings." The decrease in expenses is wholly in maintenance and probably would not have been practicable were not a large proportion of the rails and rolling stock quite new, as it was a year when expenses generally were increasing, and there was a considerable increase in train mileage. The expenditure for maintenance of cars was at the average rate of $51½ each, which is more than on the Erie last year, but about $30 less than on the New York Central, and probably as much below what will be required on the average in a long term of years to keep the stock good. For maintenance of locomotives the expenditure was $1,842 each. The chief saving in comparison with the previous year, however, was in maintenance of way, and the particular item which shows a large decrease is repairs of track, which cost $141,950 (30 per cent.) less than in 1881. The maintenance of way expenditures were the smallest since 1877. It is therefore probable that the expenses were below what they will be in the average year with similar traffic and prices, unless some improvements can be introduced which will permit the increase of the average train loads, which last year were 52 passengers and 144 tons of freight.

We see above that though there was a trifling de-

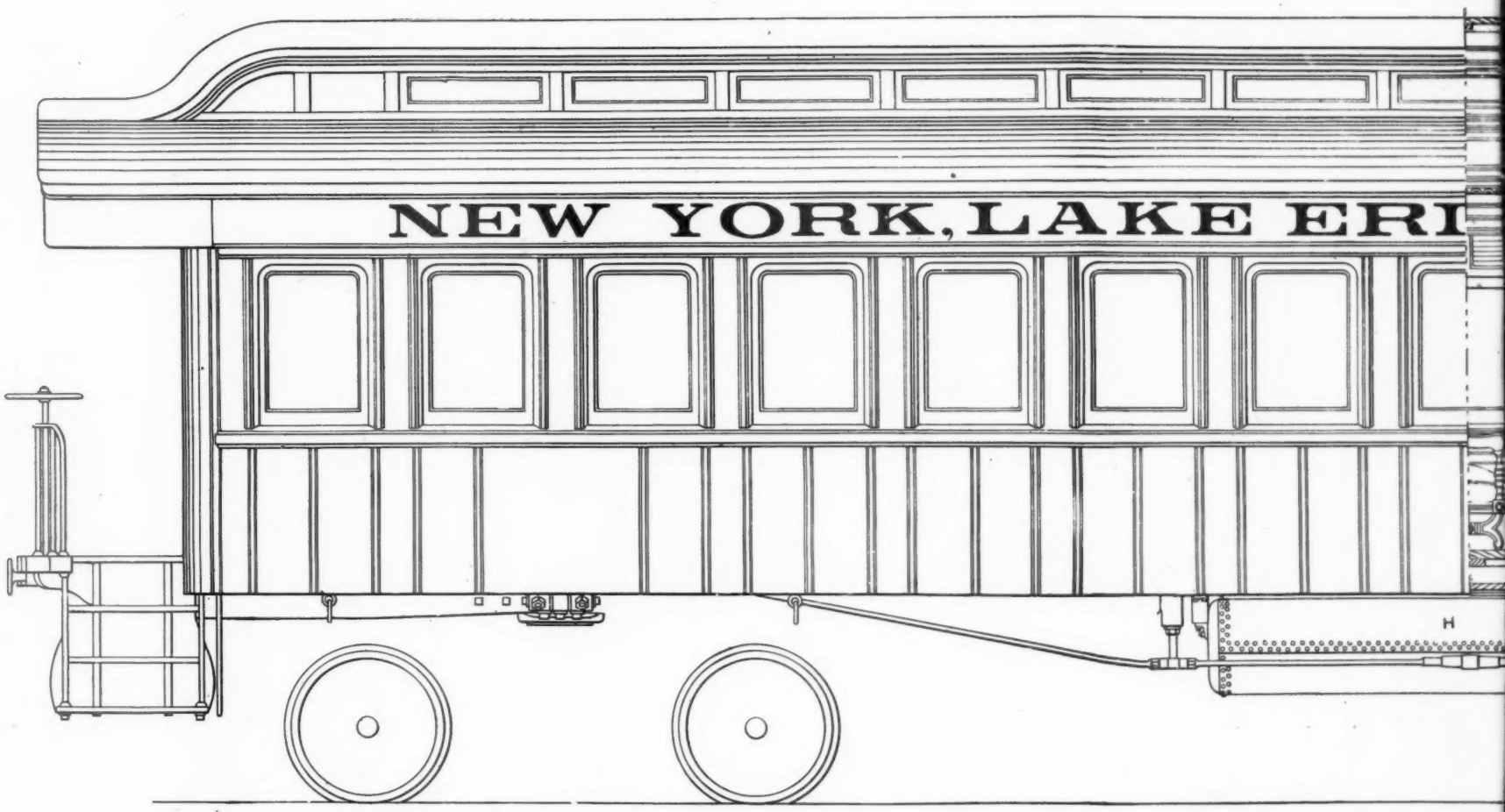

Fig. 5

PINTSCH'S SYSTEM OF LIGHTING

(For description see

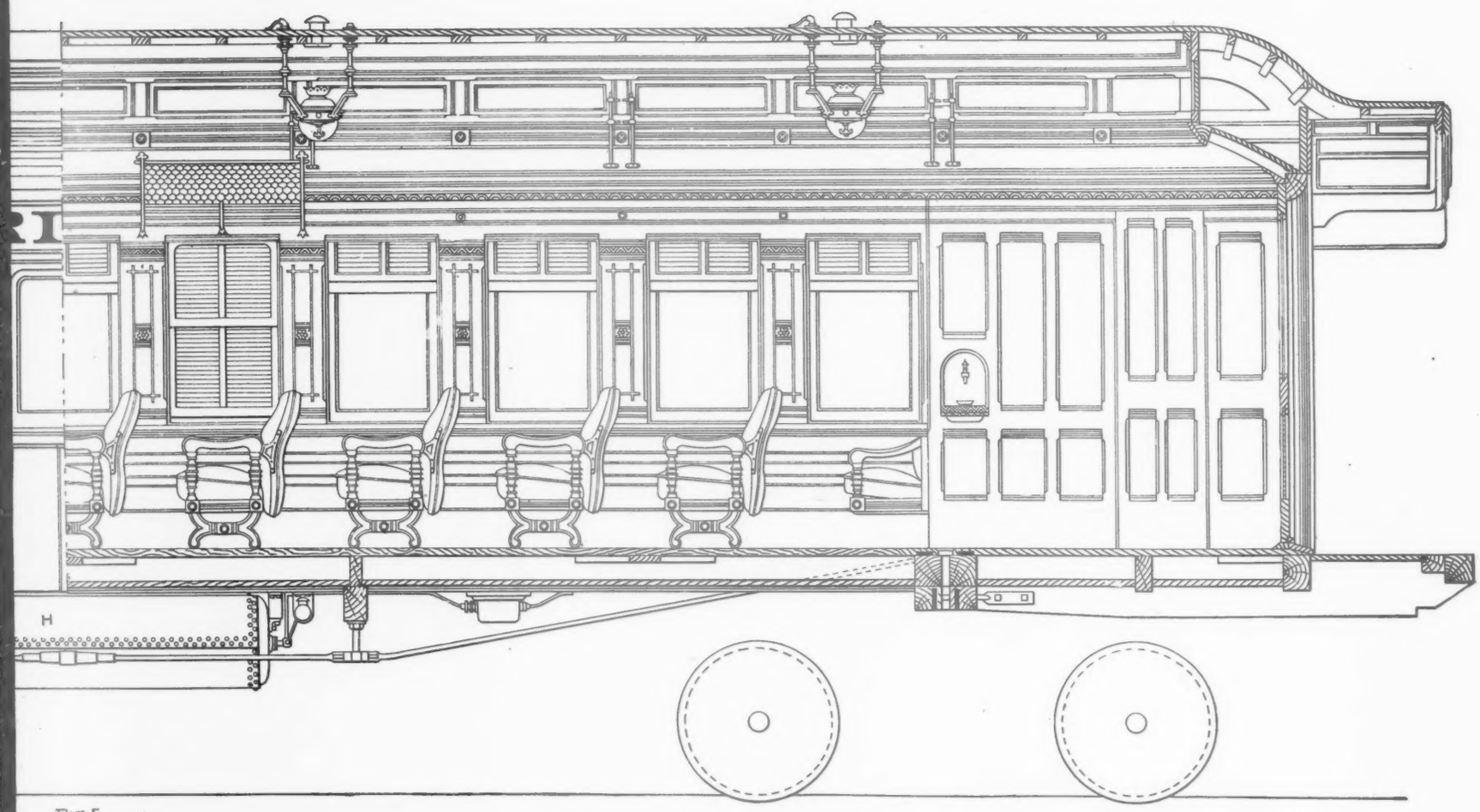

Fig. 5.

GHTING RAILROAD CARS WITH GAS.

scription see page 209).

crease in expenses from 1881 to 1882, there was a considerable increase over previous years. But this is not true of the expenditures for maintainence of cars and way. The maintenance of car expenses were less than in 1880, when the stock of cars was one-third less, and the maintenance of way expenses in successive years have been:

1878.	1879.	1880.	1881.	1882.
$739,872	$871,625	$727,345	$728,136	$593,486

Very likely more than average renewals were made in some of these years, but in all probability less than the average were made last year. The total maintenance expenses were also much less last year than in any of the three previous years, notwithstanding a large increase in rolling stock and train mileage, and a general increase on most roads of the country.

This indicates that, however the other branches of expenses may be reduced under the lease, the expenditures for maintenance will probably have to be increased, and so far will make the terms of the lease more onerous to the Erie.

As the transfer of one of the Erie's freight lines was made from the Cleveland, Columbus, Cincinnati & Indianapolis to this road at the beginning of the year, it will be interesting to compare some of the results of their working in the last two years:

	1882.	1881.	Inc. or Dec.	P.c
Total ton miles:				
C. C. C. & I.....	447,411,484	480,723,710	D. 83,312,226	6.9
N. Y. Pa. & O	694,147,402	609,482,972	I. 84,664,430	13.9
Through ton miles:				
C. C. C. & I	359,522,229	371,863,430	D. 12,341,201	3.3
N. Y., Pa. & O.....	575,993,566	484,489,518	I. 91,504,048	18.9
Pass. miles:				
C. C. C. & I..... .	44,759,982	41,689,179	I. 3,070,803	7.4
N. Y., Pa. & O.....	66,125,091	65,982,669	I. 142,422	0.2
Freight earn:				
C. C. C. & I.....	$3,159,417	$3,225,356	D. 65,939	2.0
N. Y., Pa. & O.....	4,315,028	4,057,264	I. 257,764	6.4
Total net earn:				
C. C. C. & I.	1,374,697	1,323,181	I. 51,516	4.0
N. Y., Pa. & O	1,992,785	1,629,227	I. 363,558	22.3

We find an increase of 91¼ millions of through ton miles on the New York, Pennsylvania & Ohio road, and a decree of 12½ on the Cleveland road. both probably largely due to the change in the freight lines, but also probably partly due to the immense contracts for west-bound freight made by the Erie just as the transfer was made. At least the Pennsylvania & Ohio traffic was unusually large then, when through traffic generally was light. In that half of the year its through traffic was but 2 per cent. less than in the last half. We have not the traffic of the Cleveland company for the two half years separately; but the total freight earnings and the net earnings of the two roads in the first and second halves were:

Freight earn:	First half.	Second half.	Inc. 2d half.	P. c
C. C. C. & I.....$1.304.002	$1,855.415	$551,413	42.4	
N. Y., Pa. & O.....	1,994,974	2,320,054	325.080	16.3
Net earn.:				
C. C. C. & I...	437.367	1.040.453	603.084	115.0
N. Y., Pa. & O.....	745.470	1,247.314	501,844	67.3

The Cleveland road thus made much the largest gain in freight earnings and in net earnings in the last half of the year, when the traffic was most valuable. In the first half its expenses were nearly 77 per cent. of its earnings, as against 72¼ on the other road; while in the last half they were but 59½, against 63.

It would appear from this that the first transfer of the freight line and the contracts then made brought the New York & Pennsylvania in the first half of the year a large increase in freight and a considerable increase in freight earnings, and some increase in profits. The through freight traffic was 72 millions (34 per cent.) more in the first half of 1882 than in 1881, but in the second half it was but 7 per cent. more, whence it may be inferred that the increase was abnormally large in the first half.

With the Chicago & Atlantic opened the position of this road as a carrier of through freight and passengers will be improved and strengthened; but as an intermediate link in a through line its natural place is as a part of a road either east or west of it, so that it or its lessee may absolutely command the traffic on which it chiefly depends. If it had had credit and could have itself leased lines to Cincinnati, St. Louis and Chicago, it would probably be strong enough to stand alone, sure of a fair interchange of traffic with some line to the East if it had something important to give. As it is, its best resource is a lease to the Erie, which has always been its chief and almost its sole outlet to the seaboard.

THE DIAMOND CAR TRUCK.

Owing to the present general tendency throughout the country to increase the load and weight of freight cars, it becomes a matter of considerable interest to see whether the existing arrangement of trucks will stand the extra load.

In discussing the best form of arch-bars for the diamond car truck, two things must be borne in mind. Either a given weight of material must be arranged in the form which will give the greatest strength; or with a certain factor of safety a given load must be carried with the smallest amount of material.

In the older forms of trucks the upper and lower bars were made of the same thickness, without any reference to the *kind* of strain to which these bars were subjected; but lately it was pointed out that the top bar was in a state of compression, and the lower bar in a state of tension, and inasmuch as iron is stronger in tension than in compression, it was argued that the thickness of the top bar should be increased.

At the same time, it must be remembered that the bolt (or rivet) holes in the lower bar detract from the area capable of resisting tension, while in the upper (or compression) bar they will not affect it so long as they are filled with something as hard as the bar itself. The bottom tie-bar might also be reduced to ½ inch thick.

These statements were admirably borne out by the report of the Committee on Standard Freight and Passenger Car Trucks, published in the *Railroad Gazette* of Nov. 3, 1882. In no case did the truss fail through the crippling of the bottom tie-bar. In every case of the bolt or rivet head breaking, the diameter of bolt was under an inch. In some of the results published in that report, the material seemed distributed in the most arbitrary manner. But if looked at in the light discussed below, it will be seen that each bar will be proportioned correctly to the amount and kind of strain to which it will be subjected. Of course the question can only be discussed in a statical point of view, for it is clearly impossible to take into account all the strains and forces to which it would be subjected in actual practice, though by allowing a considerable margin of safety, danger on that score may be avoided.

The statical strains which each bar in a diamond truck frame bears can perhaps be best understood if we first consider the strains on a frame or truss, fig. 1, consisting of an arch bar on top, loaded at *L* and with a straight tie-bar *T* below. In that case it is obvious that the tie-bar or horizontal member does not carry any of the load. The same thing is true of a truss, fig. 2, with an inverted arch-bar or truss-rod below, and a straight compression beam above. In a diamond truss, fig. 3, if the inclination of the top and bottom members is the same, the top members *A A* will carry one half of the load *L* and the lower members will carry the other half, and the horizontal thrust of *A A'* will be just equal to the pull of *B B'*, and those opposite forces will be equal to each other, so that a horizontal tie-bar is not needed. If the inclination of the top and bottom members is not the same, then the proportion of the load *L* which they will carry will not be equal. The reason for this is that the nearer the top or bottom the members are to being horizontal the greater will be the strain in that direction produced by the load which they support. If the load on *A A'* of fig. 4 was equal to that carried by *B B'*, the effect would be that the lower ends of *A A'* would be pushed outward with a greater force than that with which *B B'* is pulled inward. The result would be that the upper ends of *B B'* would be pushed outward, which would raise up the king-post *R*, thus causing a greater proportion of the load *L* to be supported by *B B'*, until the horizontal thrust of *A A'* would be just equal to that of *B B'*.

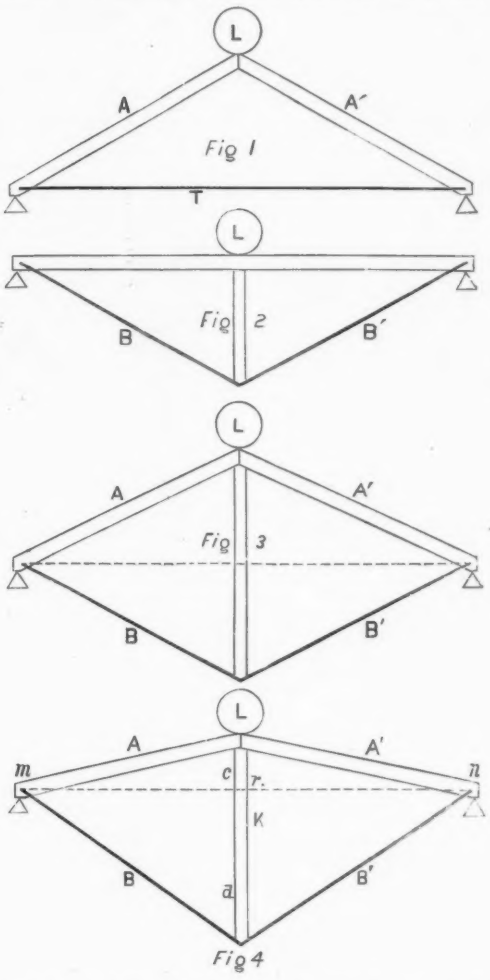

Fig 4

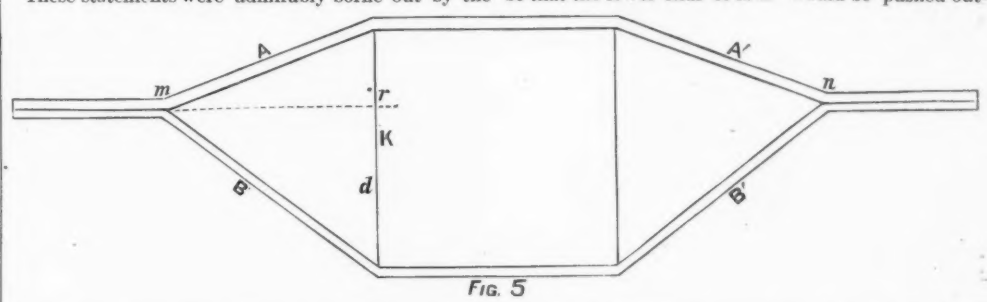

FIG. 5

Without further proof, then, it may be assumed that the horizontal thrust of the top and bottom members will always be equal. The strains, too, on the different members of a truss, by the well known principle of the parallelogram of forces, is proportionate to the sides of a triangle parallel with the direction in which the forces cut. Thus in fig. 4 the horizontal strain of both the top and bottom members being equal is proportionate to the dotted line *m n*, the strain on *A* and *B* to the sides *m L* and *m s* of the triangles *m r L* and *m r s*, and the load which the upper and lower members carry to the sides *L r* and *r s* of the same triangles.

It is also plain that of that portion of the load carried by *A* and *A'* one-half is carried by *A* and the other half by *A'*. The same thing is true of that part carried by *B* and *B'*. Therefore, to calculate the strains on *A* and *B*, we must first find what proportion of *L* each

carries. If a represent the part of L carried by A, and b the part carried by B, and c equals $L\,r$, d equals $r\,s$ and K is equal to $L\,s$, we will have:

$$a : \frac{L}{2} :: c : K$$

and $$b : \frac{L}{2} :: d : K$$

$$\text{therefore } a = \frac{\frac{L}{2} \times c}{K} \text{ and } b = \frac{\frac{L}{2} \times d}{K}$$

The strains on A and B are, as stated, proportionate to the sides of the triangles $m\,L\,r$ and $m\,r\,s$. If these strains be represented by x and y then

$$x = \frac{\frac{\frac{L}{2} \times c}{K} \times A}{c} = \frac{\frac{L}{2} \times A}{K}$$

and $$y = \frac{\frac{\frac{L}{2} \times d}{K} \times B}{d} = \frac{\frac{L}{2} \times B}{K}$$

In other words, to get the strain in the top and bottom numbers of a truss of this kind, *multiply one-half the load by the length of the member and divide by the height of the truss.*

The principle of the parallelogram of forces, however, gives a shorter method of evolving this rule. As the strains in a truss of this kind are proportional to the sides of a triangle parallel to the direction in which the forces act, we have:

$$x : \frac{L}{2} :: A : K$$

and $$y : \frac{L}{2} :: B : K$$

$$\text{or } x = \frac{\frac{L}{2} \times A}{K}, \text{ and } y = \frac{\frac{L}{2} \times B}{K}$$

The problem has been reasoned out according to the first method in order to make the action of the forces clearer to those not accustomed to such calculations than it appears to be by the last method.

The strains in a diamond truck frame, fig. 5, may be calculated in exactly the same way as above; the fact of the arch bars being horizontal in the middle for some distance does not affect the strains, if the horizontal portions are so constructed that they cannot change their shape.

From the formulæ and the rule, the conclusion may be deducted that the strain on either of the arch-bars, for a given load and height of truss, varies directly as the length of the inclined parts $P\,m$ or $Q\,n$, which is nearly in proportion to the spread of the truck, and inversely as the height of the truss or truck frame. That is, the greater the distance apart of the wheels the greater will be the strain on the arch-bars, and the greater the depth of the truss the less the strain on them. In the tests made which were reported to the Master Car-Builders' Association by the Committee on Standard Freight and Passenger Car Trucks, in nearly all cases it was the top arch-bar which failed by buckling. In nearly all of them the lower arch-bar had more strength than was required. In order to get the maximum strength, then, with the weight of material which is now used, it is essential in most cases to increase the strength of the top arch-bar to resist compression. This may be done by making its section of a different form which will resist deflection better than a flat rectangular base, or by increasing the amount of material in it. The latter, in many cases, may be done by diminishing the size of the lower arch-bar and putting the superfluous material into the upper one. It is not easy, however, to determine by calculation the capacity of a top arch-bar to resist deflection. So much depends upon the manner in which it is connected to the other parts, its proportions, etc., that no very exact deductions can be made by figures alone. The lower arch-bar can, however, be very accurately proportioned for the work it must do by calculating the strain it must bear and allowing for the loss of sectional area due to bolt or nut holes, and then allowing a breaking strength of ten times the load to be carried. Some very useful work could be done by proportioning truck frames according to calculation and then testing them, loading them until they break down.

It must, however, be borne in mind that the simple strength of the truss is not the only element to be considered, but that the lateral stiffness must also be taken into account. But, considering the width of the bars in comparison to their thickness, their lateral stiffness will be considerable.

In this way it seems probable that the present practice in the distribution of material in the form of truck described might be considerably modified, and the truck thereby increased in strength.

RAILROAD EARNINGS IN FEBRUARY.

Earnings in February are given in our table by no less than 78 roads, which worked this year 55,611 miles of road, and 4,346 miles, or 8½ per cent., more than last year, and about one-half the mileage in the United States. With this mileage they earned $25,217,732, which is $1,024,754, or 4.2 per cent., more than last year, their average earnings per mile having *decreased* from $472 to $453, or 4 per cent. This is not a very favorable showing, as in January the 75 roads reporting showed a decrease of 1.2 per cent. in earnings per mile, but it is much better than was indicated by reports published early in March, when 56 roads reporting had an average decrease of 8 per cent. in earnings per mile. The Northwestern roads suffered much from snow in January, and this had an unfavorable effect on a number of roads, nearly all of which reported early, however.

February was not an exceptionably favorable month last year; there was a fairly active traffic, but it was a season of very poor crops, the effect of which was felt more a little later, however. There was, it is true, a great gain in 1882 over 1881, but February in 1881 was a month of much worse snow blockades than we have had this year. Then the earnings per mile were 10 per cent. less than in 1880, and the increase in 1882 of 9 per cent. over 1881 only brought them back to their old place. The decrease this year is not from exceptionally large earnings, therefore, but in view of the large increase in mileage it is not particularly significant. It might be thought so, because it is a decrease in a good crop year from the earnings in the worst crop year, but, as we have said, the effect of the crop failure was not fully felt until after February last year. Though there was little grain, what there was came forward with unusual rapidity, and during the rest of the year the traffic was extremely light.

We have heretofore called attention to some features of the earnings—how very generally the Northwestern roads had large decreases, but only about the same as in January; that some roads had a decrease in February which had had an increase in January, and that many roads had much smaller increases in February than in January. The 75 roads reporting for January in the aggregate had an increase of $2,139,928; in February the 78 roads had an increase of but $1,024,754. The latter tells the story plainly. February was not so good a month as January, even on the roads that were doing well. There was a certain stagnation in traffic, which seems to have generally disappeared in March, and on many lines has been replaced by great activity.

In February 25 of the 78 roads had smaller total earnings this year than last, and 29 had smaller earnings per mile. There is an unusual number of large decreases in earnings per mile, but also a large number of large increases. No less than 14 had a decrease or more than 20 per cent., the largest percentages being 59.2 per cent. on the Des Moines & Fort Dodge, 32.6 on the Marquette, Houghton & Ontonagon, 31.7 on the Manitoba, 28.8 on the St. Paul & Omaha, 26.4 on the Northern Pacific, and 25 for the Burlington, Cedar Rapids & Northern.

On the other hand, there were 17 roads which had an increase in earnings per mile of more than 20 per cent., the largest percentages being 274 by the Vicksburg & Shrevesport, 110 by the Elizabethtown, Lexington & Big Sandy, 70 by the Western North Carolina, 54 by the Central Branch Union Pacific, 52 by the Western North Carolina, 51½ by the Little Rocky, Mississippi River & Texas, 42¾ by the Ohio Central (all these great increases by roads which still have very light earnings), 39 by the International & Great Northern, 31¾ by the Eastern, 28½ by the Charlotte, Columbus & Augusta, and 26 by the Georgia Railroad.

The roads with largest and smallest earnings per mile in February were:

Largest:	Per mile.	*Smallest:*	Per mile.
Pennsylvania	$1,813	Green B., W. & St. P	$101
Northern Central	1,512	St. Louis & Cairo	126
Reading	1,455	Vicks., Shreve. & Pac	124
Eastern	951	Western North Carolina	145
Iron Mountain	641	Des Moines & Ft. Dodge	156
Chicago & Alton	633	Mar., H. & Ontonagon	172
Ill. Cen., Southern Div	627	Houston E. & W. Tex	179
Missouri Pacific	627	Peoria, Dec. & Ev	179
Hannibal & St. Jo	619	Little Rock, Miss. R. & Tex	185
South Carolina	616	Northern Pacific	203
Hocking Valley	612	Little Rock & Ft. Smith	211

No other roads earned so much as $600 a mile, but there were seven others that earned less than $250 per mile.

It will be noticed that there is a great drop in the roads of heaviest earnings from the $1,455 of the Reading to the $951 of the Eastern, and from the latter to the $641 of the Iron Mountain. This is not because there are not many roads earning as much as $700 per mile per month, but because very few of them report. Among the roads earning more than $600 per mile will be noticed the Chicago, St. Louis & New Orleans (Southern Division of Illinois Central) and the South Carolina.

There is an extraordinary number of roads earning less than $200 per mile, and small as these earnings are, some of them have a large percentage of increase over last year. The Vicksburg, Shreveport & Pacific, for instance has an increase of 274 per cent. This seems a great gain until we learn that last year its earnings per mile were but *thirty-seven dollars*—the smallest amount that we have ever seen reported. And another Southern road, the Western North Carolina, which gained 70 per cent. this year, earned but $85 per mile last year.

It will be noticed that among the roads of lightest earnings stands the Marquette, Houghton & Ontonagon, which last summer usually stood in the list of roads with heaviest earnings, and not very far from top of that. Indeed, in June last it stood at the head, having then earned $2,261 per mile, and in February but $172! In about two days and a half in June it earned as much as in the whole 28 days of February. We have spoken heretofore of some roads in very severe winter climates as "hibernating." None deserve the term so well as this Ontonagon road. It is not, however, chiefly due to cold or snow that it has such a decline in traffic in winter, but because the industry which chiefly supports it, the mining of iron ore, is suspended in winter, because it is carried to market by lake. The mines, and the road with them, may be said, in a manner, to open and close with navigation.

The following table gives the earnings per mile in February of the several roads for six consecutive years, so far as they have been reported:

February Earnings per Mile—1878 to 1883.

	1878.	1879.	1880.	1881.	1882.	1883.
Ala. Gt. South	....	....	$177	$219	$230	$282
Burl., C. R. & Nor	$357	$224	335	221	362	271
Central Pacific	470	481	455	561	590	492
Chesapeake & Ohio	....	....	....	424	412	484
Chicago & Alton	443	454	592	565	609	633
Chicago & E. Illinois	390	380	524	532	526	463
Chic., Mil. & St. P	472	276	339	180	336	282
Chic. & N. W	413	507	494	344	461	353
Chic. & W. Mich	...	176	234	....	310	249
Chic., St. P., M. & Om.	....	259	237	169	332	237
Cin., Ind., St. L. & Chi.	489	472	601	572	490	374
Cleve., Akron & Col	173	156	220	205	229	230
Col., Hock. V. & Tol	....	....	....	476	532	612
Denver & R. G	181	....	381	577	383	374
Des Moines & Ft. D	....	141	246	160	382	156
Det., Lansing & N	....	292	. .	233	517	405
Eastern	572	548	....	681	723	951
Flint & Pere M	....	276	400	377	475	479
Georgia	436	350	409	417	371	467
Hannibal & St. Jo	495	469	572	421	523	619
Ill. Cen., in Ill	465	432	558	483	588	482
Ill. Cen., in Iowa	327	245	315	201	389	303
Ind., Bloom & W	425	391	425	208	317	292
Int. & Gt. Nor	217	285	266	337	272	379
Lake Erie & West	....	....	191	228	250	280
Louisville & Nash	431	443	519	438	474	497
Mil., L. S. & W	128	123	162	128	239	212
Mo., Kan. & Tex	231	248	417	384	332	373
Missouri Pacific	....	....	....	565	597	627
Mobile & Ohio	358	337	403	428	300	326
Nash., Chat. & St. L	441	453	421	409	332	362
N. Y. & New Eng	....	....	474	549	549	581
Norfolk & West	276	284	379	359	350	416
Northern Central	693	839	1,015	1,174	1,284	1,512
Northern Pacific	....	....	....	109	277	203
Pennsylvania	1,211	1,421	1,573	1,638	1,720	1,813
Peoria, Dec. & Ev	....	....	171	196	228	179
Phila. & Reading	603	1,026	1,172	1,344	1,298	1,455
St. Louis & Cairo	92	112	173	217	102	126
St. L., A. & T. H., Main Line	....	342	559	522	524	592
Belleville Line	495	622	771	530	464	514
St. L., Iron Mt. & S	499	496	716	818	696	641
St. L. & San Fran	253	262	381	301	371	326
St. P., Min. & Man	...	...	210	216	455	312
Scioto Valley	....	206	204	229	286	246
South Carolina	388	383	475	539	522	616
Texas & Pacific	395	410	494	326	244	297
Union Pacific	....	....	....	414	482	381
Wabash, St. L. & P	...	489	406	330	336	304
Wisconsin Central	....	....	..	201	205	232

The number of roads which had larger earnings in some previous year were:

24 out of 50 in 1882.
17 " " 49 " 1881.
20 " " 43 " 1880.
9 " " 38 " 1879.
8 " " 31 " 1878.

For the two months ending with February, our table has reports from 77 railroads with 57,157 miles of road this year, and 8½ per cent. more than they worked last year. With this increase of mileage, their earnings were larger by 6.2 per cent., their average earnings per mile having decreased from $990 to $969, or 2.1 per cent. Of the 77 roads 23 had smaller total earnings, and 28 smaller earnings per mile.

February Accidents.

The month of February has attained a bad eminence this year, its record, given in full in another page, showing no less than 184 accidents, in which 61 persons were killed and 186 wounded, a list of casualties sufficient for a very respectable battle.

Included in these accidents are 52 collisions, in which 22

persons were killed and 54 injured; 113 derailments, in which 38 persons were killed and 130 injured, and 19 other accidents, in which one person was killed and two injured.

In 36 of these accidents the death of one or more persons was caused; in 32 others there was injury but not death, leaving 116, or 63 per cent. of the whole number, in which no serious injury to persons is recorded.

As compared with February of last year, there was an increase of 96 accidents, of 38 killed and of 117 injured.

These accidents may be classed as to their nature and causes as follows:

COLLISIONS:		
Rear collisions	32	
Butting collisions	17	
Crossing collisions	3	
		—52
DERAILMENTS:		
Broken rail	24	
Broken frog	1	
Broken switch-rod	1	
Broken bridge	5	
Spreading of rails	4	
Broken wheel	5	
Broken axle	6	
Broken truck	2	
Wash-out	8	
Land-slide	2	
Snow	5	
Accidental obstruction	5	
Misplaced switch	4	
Cattle on track	2	
Flying switch	1	
Runaway engine	1	
Running off end of siding	1	
Unexplained	36	
		—113
Broken connecting-rod		8
Broken truck not causing derailment		1
Broken wheel not causing derailment		1
Broken tire not causing derailment		1
Broken axle not causing derailment		3
Broken piston rod		1
Runaway engine		1
Cylinder head blown out		1
Cars burned while running		2
Total		184

Three collisions were caused by the wrecking of other trains; three by misplaced switches; three by fog; two by trains breaking in two; one each by mistakes in orders, by a flying switch and by cars carelessly left on the main track. The proportion of collisions to the total number of accidents is unusually small.

Of the accidents given 112 are recorded as taking place in daylight, and 60 at night, while in 12 cases the time is not definitely fixed.

A general classification of these accidents may be made as follows:

	Collisions.	Derailment.	Others.	Total.
Defects of road	..	35	..	35
Defects of equipment	2	14	16	32
Negligence in operating	44	7	1	52
Unforeseen obstructions	6	21	2	29
Maliciously caused	..	..	..	..
Unexplained	..	36	..	36
Total	52	113	19	184

Negligence in operating caused 28.3 per cent. of all the accidents. Probably a large number of the unexplained derailments were due to snow.

The persons killed and injured may be divided as follows:

	Killed.	Injured.	Total.
Employés	43	67	110
Passengers	18	119	137
Total	61	186	247
Per cent. of employés	70.5	36.0	44.5

The proportion of employés was somewhat smaller than usual last month.

A division according to classes of trains and accidents is as follows:

Accidents:	Collisions.	Derailments.	Other.	Total.
To passenger trains	6	47	14	67
To a pass. and a freight	6	..	..	6
To freight trains	40	66	5	111
Total	52	113	19	184
Casualties:				
Killed by	22	38	1	61
Injured by	54	130	2	186
Total	76	168	3	247

The month was about as bad a month for railroads as could well be. Intense cold and deep snow prevailed in most parts of the country for part of the month, and heavy rains and sudden melting of snow upon ground hard frozen beneath resulted in disastrous floods. The effect of these floods is seen in the number of wash-outs, while the very great number of broken rails, broken axles and similar accidents are characteristic of the weather. In spite of, perhaps on account of, the bad weather, the accidents of management are unusually few in number. It may be that the unavoidable dangers kept trainmen and superintendents up to their work and caused unusual vigilance, for the misplaced switches, rear collisions and similar pieces of carelessness are comparatively few in number. The other accidents, however, more than make up for this, and bear unmistakable testimony to the severity of the winter.

For the year ending with February the record is as follows:

	Accidents.	Killed.	Injured.
March	99	29	101
April	81	18	61
May	94	24	86
June	72	35	193
July	92	18	56
August	139	46	218
September	153	34	136
October	136	47	132
November	125	36	129
December	148	29	209
January	168	55	190
February	184	61	186
Total	1,491	432	1,706

No other month had as many accidents or as many killed as February, but the number of injured was exceeded in three months of the year.

The averages per day were 6.57 accidents, 2.18 killed and 6.64 injured; for the year they were 4.08 accidents, 1.18 killed and 4.67 injured.

The average casualties per accident were, for the month, 0.332 killed and 1.011 injured; for the year, 0.289 killed and 1.144 injured.

The averages per month for the year are 124 accidents, 36 killed and 142 injured. February is considerably above the average.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Denver & Rio Grande Western.—Extended southeast to the Colorado line 123 miles. Gauge, 3 ft.

Georgia Pacific.—Extended eastward into Walker County, Ala., 11½ miles. Gauge, 5 ft.

Kansas City, Fort Scott & Gulf.—The *Memphis Extension* is extended southeast to Augusta, Mo., 15 miles.

Oregon Railway & Navigation Co.—The *Baker City Branch* is extended from Pendleton, Or., east 15 miles.

Philadelphia & Reading.—The *Marietta Branch* is completed from the junction with the Columbia Branch southwest to Chickie's furnace, Pa., 6 miles.

Silver City, Deming & Pacific.—Track laid from Deming, N. M., to Black Mountain, 8 miles.

York & Peachbottom.—Extended from Delta, Pa., north east to Peachbottom, 5 miles. Gauge, 3 ft.

This is a total of 183½ miles, making 705 miles thus far reported for 1883, against 1,358 miles reported at the corresponding time in 1882, 682 miles in 1881, 887 miles in 1880, 317 miles in 1879, 242 miles in 1878 and 190 miles in 1877. The mileage reported thus far this year is less than in any year since 1879.

CHICAGO RAIL SHIPMENTS EASTWARD, including grain, flour and provisions, through and local, but *not* the entire through pool shipments, were but 48,092 tons in the week ending March 31 last, against 25,837 tons in the corresponding week of last year, and 70,707 in the previous week of this year. Of the shipments last week 3,018 tons, (all grain but 24 tons) went by the New York, Chicago & St. Louis.

The report of pool shipments for the last 10 days of March is not made yet. This reduction of 22,000 tons from the third to the fourth week of the month, however, makes it nearly certain that the total shipments of the month were less than in 1880, and also less than in January, 1882. The movement continues lighter, and it was not to be expected that it would be as heavy in April as in March. After the very heavy shipments of 318,983 tons in March, 1880, but 186,543 tons went forward in April. Navigation will probably be open in about three weeks, and this will tend to keep back shipments to wait for lower rates. Vessels in Chicago have been taking in cargoes for Buffalo at 3 cents for corn and 3¼ for wheat. Last year this rate at the time of the opening was 2¼ cents for wheat; in 1881, 5 cents. But it does not follow that 3¼ cents will be paid at the time of opening because it is paid now.

Though the rail shipments are likely to be considerably less in April than in March, it is not likely that they will be unusually light, as they have been sometimes in April, as may be seen by the following statement of shipments in each month for the first four months of the year, in tons:

	1879.	1880.	1881.	1882.	1883.
January	162,512	163,378	263,872	321,148	257,093
February	198,541	166,541	204,331	225,816	223,446
March	258,458	318,983	212,021	179,145	*295,000
April	208,042	186,543	275,417	138,472	..

* Last week estimated.

In every year but last, rates were lower in April than in March. In 1880 and 1882, lake navigation opened about April 1, in the other years not till near May 1. This of itself makes a great deal of difference with the rail shipments of the month. What goes forward this month, this year, must go by rail. There is no lack of produce to come forward, but the season has been so late that the farmers will probably confine themselves pretty closely in April and May to putting in crops and not give much attention to marketing them. Under these circumstances we shall have in April shipments which will doubtless be larger than in 1882 or 1880, but probably less than in 1879, and very likely less than in 1881.

Under circumstances such as exist at present it has been common to reduce rates, in order to attract from the elevators some of the grain that would otherwise wait for the opening of navigation. It is questionable whether anything is to be made by this, however. More grain than formerly goes to interior points for consumption, and the railroads will get this without reducing rates. And if the grain now in store is carried off before navigation opens, the vessels will compete all the more sharply for what arrives afterward.

THE DEATH OF PETER COOPER removes one of the American railroad pioneers—the first man to build a locomotive in America. His machine was of little direct importance, it is true, and Mr. Cooper's connection with railroads was not long nor intimate, but his services were characteristic of the man—always ready to give time, labor and money for the good of his fellow-men. In 1829, when the Baltimore & Ohio Railroad had been opened for 13 miles to Ellicott's Mills, it was still a question whether it should eventually be worked with horses or by steam power, and it was feared that a locomotive could not be made to work on so crooked a road. Mr. Cooper, largely to prove that the road could be worked by steam, constructed on his own account a little engine of about one horse-power, which on Saturday, Aug. 28, 1830, was tested on the road, and ran the 13 miles and back with one passenger car, carrying 24 persons, in two hours and 10 minutes. The late Ross Winans, whose judgment in such matters carried great weight, and who had seen the "Rocket" win the prize at Liverpool the October previous, the very day of the trial wrote to the President of the Baltimore & Ohio Company saying: "To-day's experiments must, I think, established beyond a doubt the practibility of using locomotive steam power on the Baltimore & Ohio Railroad for the conveyance of passengers and goods at such speed and with such safety (when compared with other modes) as will be perfectly satisfactory to all parties concerned.

Some years ago, at a meeting of the American Master Mechanics' Association in New York, the venerable Mr. Cooper told the story of his tiny engine and the trial of it to the men who then had charge of more than 14,000 locomotives, by which 70,000 miles of railroad were worked in the United States, which, at the time of his death, had increased to 22,000 locomotives and 113,500 miles of railroad—represented at this trial by his little "Tom Thumb" and about 20 miles of track worked by horse power. Railroad men will be glad through this to connect with the beginning of American railroads the great philanthropist, who seemed always aglow with a fine enthusiasm to help struggling mortals forward in the world.

THE INCREASE IN FLOUR PRODUCTION has been so great that the movement of the wheat crop will be wholly misunderstood if the receipts and shipments of wheat alone are considered. To prevent this, and to show what the growth of flour production has been, and also the true movement of the wheat crops, we have below given the receipts of flour reduced to bushels and the wheat receipts at the seven Atlantic ports from September 1 to March 24, last:

	1879-80	1880-81	1881-82	1882-83
Flour	29,403,616	36,439,880	30,603,456	46,750,972
Wheat	72,659,805	63,322,284	32,330,140	55,568,394
Total	102,063,421	99,762,170	62,933,596	102,319,366

Thus, though the receipts of wheat from the crop of 1882 were 17,091,000 bushelf less than from that of 1879, in wheat and flour together there is a small increase. There were 17,347,000 bushels more flour from the large crops of 1882 than from the almost equally large crops of 1879. The flour formed less than 29 per cent. of the whole in 1879-80, 36⅛ in 1880-81, 48½ in 1881-82, and 45⅝ in 1882-83.

A German Diagnosis of a Railroad Accident.

Last September an excursion train carrying soome 200 passengers ran off the track of a government railroad in Baden, close to the border of Alsace, causing the death of 72 passengers, injuries to about 70 more, such that they were in hospital for a time, and slighter injuries to a number which was variously estimated from 50 to 100—most of these going home directly.

Immediately on the news of the accident, the "Imperial Railroad Bureau" dispatched an expert railroad officer to investigate the accident. His report on it, interesting as describing one of the most fatal of railroad accidents, and more so, perhaps, as indicating the method followed to ascertain the cause of a derailment for which there was no obvious cause, we translate below, somewhat abridged:

Origin and Make-up of the Train.—It was agreed by the general administrations in Strasburg and Carlsruhe, an extra excursion train was appointed to be run between Münster, by way of Colmar, to Freiburg in Baden and return, on Sept. 3, 1882. It was to be made up to carry 1,200 persons, and was to start from Colmar at 7:40 a. m., and arrive in Freiburg at 9 a. m. On the return trip, the train was to leave Freiburg at 8:10 p. m., arrive at Colmar at 9:20. The speed going was not to exceed 45 kilometres [27 miles] per hour at the outside, and at 40 kilometres [25 miles] per hour on the return.

The Grand Ducal Railroad Administration of Baden agreed to furnish the locomotive and engineman, as well as the train hands, and the Imperial General Administration in Strasburg was to provide the cars for the train.

The train, as arranged, started with 54 axles, consisting of the Baden locomotive "Kniebiss" and its tender, 26 two-axle Alsace-Lorraine third-class passenger cars, and a two-axle Alsace-Loraine covered freight car as a protecting car, from Colmar, and it arrived in Freiburg, 5 minutes late, at 9:05. The train hands belonged to the Baden Railroad, but there were two guards belonging to the Alsace-Lorraine railroad administration, who had been sent along to assist. They had nothing else to do but to run the train back again in the evening.

For its return trip, the train was left as first made up, only a Baden baggage car with brakes being added to render it complete. The latter ran as a protecting car behind the locomotive, and the passenger cars were coupled on behind the baggage car in the reverse of the order in which they had started. In addition to the tender, cars 1, 2, 8, 15, 20, 27 and 28 (the freight car), were furnished with brakes, and one-fourth of the entire number of axles could be braked. The brakes were served by the conductor, two guards belonging to the Alsace-Lorraine administration, two Baden Railroad guards and a Baden brakeman. The seventh brakeman's seat was unoccupied.

The locomotive of the train was a three-axle coupled freight train engine, with a wheel-base of 3.450 meters [11 ft. 4 in.] and wheels of 1,525 meters [5 ft.] diameter. The weight of the engine was 35,490 kilos. [78,000 lbs.] of which 13,080 kilos. [28,775 lbs.] were on the front axle, 12,030 kilos. [26,465 lbs.] on the centre axle, and 10,380 kilos. [22,835 lbs.] on the rear axle, and the weight of the two-axle tender, inclusive of water and coal, was 18,000 kilos. [39,600 lbs.]

The excursion train started from Freiburg at 8:15, a regular schedule train having arrived from Colmar a few minutes previously.

At the time of departure of the train which was to follow the excursion train at 8:20, no answer having been received from the next station to Freiburg, Hugstetten, in response to a telegram this train was sent off 13 minutes late from Freiburg, the conductor being warned to proceed carefully, but it was halted at watchman's station 4 by a signal to stop. Through the alarm, and signal for a helping locomotive first sent out from this station by the electric bell apparatus, the station officials at Freiburg re-

ceived the intimation that an accident had occurred. The first telegraphic information of the disaster reached Freiburg from Colmar, by way of Appenweir, at 10 minutes past ten and read:

"Information received that extra train is derailed. No details."

Condition of the Train and the Place of Accident after the Derailment, and the Consequences that Ensued.—As was determined by careful investigation, it was found that the train, with the exception of the four last cars, was derailed at kilometer post 5.5, on a straight track, with an incline of 1 to 146 and in the following manner:

The locomotive and tender stood upright in the meadow at the left side of the track, on one side of kilometer post 5.5. It was turned as though running away from the track, about 9 meters [29½ ft.] from the track centre, apparently uninjured, but with its wheels embedded to and partially over the axles in the earth; the tender-brakes were set. The meadow was about 30 in. below the track level. The baggage car following the engine, in the front part of which was the caboose in which the conductor was accommodated; had run on the road-bed for about 30 meters [100 ft.] beyond the above mentioned kilometer post, and lay, half upset, on the left side of the road-bed in a reversed position, so that the front portion of the car with the conductor's caboose was turned to the rear, and the car must therefore have turned completely around in a horizontal direction. The first passenger car, next to the protecting car, lay on the *right* of the track about 20 meters [66 ft.] further forward, about 5 meters [16½ ft.] from the track centre in an inverted position, the car-body in ruins; while the second passenger car had run in the same direction as the protecting car and had telescoped with it, so that the end walls of each were smashed, the first compartment of the passenger car being completely demolished. The following five passenger cars had so far remained together that they lay part with entirely crushed and part with incompletely crushed bodies, pushed into and over each other and stretching from the left side of the road-bed clear across it and to a distance beyond it of about 10 meters [33 ft.] from the track centre. The following, that is the eighth, passenger car had run past the last-described group of five cars and lay alongside of them, further to the right of the centre of track, completely demolished; the following seven cars lay partly across the road-bed and the culvert, partly to the right alongside the road, burying the telegraph poles under themselves and entangled in the wires, so broken and telescoped one into another that it was impossible to determine the order in which they had followed. These were followed by three partly demolished cars lying to the right of the track: these by four completely derailed; then one with the front axle off the track, and, finally, four that had remained entirely on the track. The train, which, including the locomotives and tender had stretched a distance of 257 meters [836 ft.] with buffers touching, only occupied a space of 167 meters [548 ft.], on the place of the accident after its derailment. The meadow land right and left of the track lay under water, being presumably prevented from flowing off through the culverts in consequence of their being dammed by the wreck of the cars; even during the following days, which were rainy, parts of the meadows which were naturally damp were under water near the track.

The track showed 226 meters [742 ft.] before reaching the scene of the accident, the first trace of the external pressure on the rail, and 56 meters [184 ft.] farther in the direction toward the accident, the commencement of a bending in the rail; 27 meters [89 ft.] from there, the commencement of a still greater rail-bend, and 24 meters [79 ft.] further in the same direction, the left rail of the track was displaced toward the left; 14 meters [46 ft.] further, the left rail was tipped over; 12 meters [39 ft.] further (near kilometer post 5.4), the first mark of a wheel-flange was visible, and 10 meters [33 ft.] ahead, numerous wheel-tracks could be seen on the ties, close behind which both rails were tipped; from this spot only portions of the track remained. At a further distance of 20 meters [66 ft.] began the place where the ties had been crushed and splintered and the rails bent and shoved to the left and in the direction the train was following, and in some places they were entirely missing. Rails were found bent 26 in. from their original straight line, and two pieces of a broken rail of almost equal length were found under the tender, partially forced into the ground, one piece being bent almost into a semi-circle. The plank covering of the culvert was broken, and traces of the wheels were found on the bent diagonal tie-pieces of the iron girders and on the girders themselves. Behind the culvert, both rails belonging to it were bent outward. The telegraph wires, in consequence of one of the upset cars forcing down one of the poles and snapping it off, were torn to pieces and tangled up in the wreck. The lower portion of this telegraph pole was found under the ruins of the cars, lying in the direction in which the train had traveled, but turned away from the track, while the upper portion, about 2½ meters [8 ft. 7 in.] long, lay between the upper parts of the cars.

The precise appearance of the first bends of the rails and deflections of the track could not be determined by the investigator, in consequence of the steps that had already been taken to remove the wreckage and restore the track to its normal condition.

The consequences of the derailment were that a large number of passengers were killed, severely and slightly wounded. Of the train hands, the conductor, who was flung out of the baggage-car, received a contusion in the face and a concussion of the brain, the engineer, fireman, guards and brakeman were uninjured.

Description of the Track.—The road between the stations of Freiburg and Hugstetten, in superstructure and substructure, was built for a single track. It joins the straight portion at the Freiburg station, on a curve of 420 meters [1,378 ft.] radius, and thence to the Hugstetten station it is an unbroken straight line. The grades obtained from a revised survey of levels show the following:

The horizontal track in the station, which extends for a distance of 450 meters from the centre of the depot, as follows:

For	471	meters	distance by a grade of	1 : 79
"	2,094	"	" "	1 : 86
"	1,859	"	" "	1 : 111
"	1,768	"	" "	1 : 146
"	568	"	" "	1 : 111

and finally, from here to the centre of the station at Hugstetten, by a level track. The total distance from station to station is 7,416 meters [4.6 miles.] The formation plane of the track at the height of the under side of the rail is 3.6 meters [12 ft.] broad, and between the two stations it rises from ½ to 1½ meter [20 in. to 5 ft.] above the ground level. At the scene of the disaster about ¾ meter (30 in.)

The road-bed is composed of gravelly soil and the slopes, of 1½ to 1, are well covered with grass. Where the track runs through the wood (moorland wood), at the exit of which the derailment took place, it is inclosed on both sides with a thick-set hedge, 30 in. high, running along the foot of the slopes. In a distance of 3.4 miles there is a culvert 46 in. wide intended to carry the drainage water from the left to the right side of the track. It has abutments of large hewn stones, on which is a simple iron superstructure of I beams. To these the rails are fastened directly and between and at the side of them is a plank floor to cover the opening.

The superstructure consists, for almost the entire distance, of iron rails 4 in. high, and weighing 53½ lbs. per yard, which are supported by 9 ties of pine or oak wood to each 25 ft. The rails are laid with suspended joints, and the ties are bedded in clean, coarse gravel. This superstructure is being gradually replaced with a stronger iron superstructure, consisting of steel rails 25 ft. long, 5⅛ in. high and weighing 72 lbs. per yard, and iron cross-ties, closed at their upper ends. Of this track there is laid, between the second and fourth watchman's stations, about 4,000 ft.

From Freiburg station, in consequence of road crossings at grade at distances of a little over a kilometer, watchmen are placed to watch the track and attend the crossings.

Probable Causes of the Derailment.—According to investigations instituted by the Commissioner Sept. 5, in the afternoon, at the scene of the accident, it was ascertained that the road-bed of the part of the road in question was of the prescribed width and in good condition; the superstructure, both before and behind the place where the accident occurred being in its normal position; the gauge was regular at every point; the ties and rails and their connection fastenings being in a perfectly safe working condition; no looseness of the joints was at any place perceptible, and the ballast was of good quality and plentifully disposed between the ties.

From this it would appear that we are justified in assuming that the condition of the road-bed and of the superstructure could not have caused the accident; and the track of rails 4 in. high and weighing 53½ lbs. per yard, underlaid with 9 ties to every 25 ft. rail, and its connections and fastenings may be considered strong enough for train running at such a speed as had hitherto been customary for them to attain on this part of the road.

The train consisted, as we have already described, of a three-axle freight engine, the driving-wheels (central wheels) of which were coupled to the wheels in front and behind them, all the axles being in front of the fire-box, and with a cylinder of 18 in. diameter and 27 in. stroke; then followed an empty baggage car (protecting car) 26 third-class passenger cars, among them five with brakes, and an empty freight car (protecting car) with brakes.

In the subsequent more minute examination of the engine, it was found that, in consequence as may be supposed of the derailment, only the rail clearing bar and the handle of the mud cock were bent, and the lower point of the rail clearing bar was broken off on the right side; and on the tender, the left step, the rod connecting the front brake blocks on the hind wheels and the draw-hook were bent, the latter toward the left side. The front edge of the foot-board was also slightly turned up, the left buffer-plate broken off and the coupling torn out. Every other portion remained uninjured, the flanges of the wheels in particular being without injury of any kind and not run sharp; also the coupling between the engine and tender was intact with the exception of the bending of the coupling bars, caused by the oblique position the tender assumed toward the engine after the derailment, and the rear end of the tender was entirely uninjured. Judging by the position of the lever, the engineman had not given the engine counter-pressure steam at the moment of derailment to heighten the effects of the brakes.

Considering that the uninjured rolling stock, even the locomotive with its tender, was found in a good working condition after the derailment, and that no portions of the cars were found anywhere along or on the track before the place where the disaster occurred was reached, we may assume that the entire rolling stock of the train, on leaving the Freiburg station, was perfectly safe for travel, and that no material part of any vehicle was injured until the scene of disaster was reached.

According to the foregoing explanations, the accident cannot be attributed either to the condition of the road-bed and superstructure or to that of the rolling stock; and, unless other circumstances difficult to explain and perhaps totally inexplicable occurred, as has not unfrequently been the case in railroad accidents, it must therefore be sought in the running of the train; or, in other words, in the train service.

With regard to the above described engine, it may be added that, although it is primarily designed for the transportation of freight, and especially of fast freight trains, its employment in the transportation of heavy passenger trains intended to run at a low rate of speed, as in this case for instance, and which may be regarded as approximating in nature to freight trains, cannot be objected to. Running at

RAILROAD EARNINGS IN FEBRUARY.

NAME OF ROAD.	MILEAGE. 1883.	1882.	Inc.	Dec	P.c.	EARNINGS. 1883.	1882.	Increase.	Decrease.	P. c.	EARNINGS PER MILE. 1883.	1882.	Inc.	Dec.	P. c.
						$	$	$	$		$	$	$	$	
Ala. Gt. Southern	290	290				81,765	66,731	15,037		32.5	282	230	52		22.5
Bur., Ced. Rap. & No.	690	620	70		11.3	187,001	225,631		38,630	17.1	271	362		91	25.0
Central, of Ga.	726	712	14		1.9	334,500	269,953	64,547		23.9	461	379	82		21.6
Central Iowa	244	244				79,956	80,759		803	1.0	328	331		3	1.0
Central Pacific	2,895	2,917		22	0.7	1,424,000	1,720,675		296,675	17.2	492	590		98	16.6
Ches. & Ohio, Main L.	517	435	82		18.9	250,287	179,053	71,234		39.8	484	412	72		17.8
Eliz., L. & Big San.	130	130				56,198	26,752	29,446		110.1	432	206	226		110.1
Chicago & Alton	850	850				538,537	517,897	20,640		3.9	633	609	24		3.9
Chi. & Eastern Ill.	245	245				113,391	127,214		13,823	10 9	463	516		53	10.9
Chi., Mil. & St. Paul	4,465	4,100	365		8.9	1,258,000	1,376,376		118,376	8.6	282	336		54	13.7
Chi. & Northwestern	3,580	3,200	380		11.9	1,264,907	1,474,175		209,268	14.2	353	461		108	23.5
Chi., St. P., M. & O.	1,170	1,003	167		16.6	277,760	333,265		55,505	16.6	237	332		95	28.8
Chi. & West Mich.	404	367	37		10.1	100,478	113,815		13,337	11.6	249	310		61	19.7
Cin., Ind., St. L. & Chi.	384	384				143,468	188,072		44,604	23.7	374	490		116	23.7
Cleve., Akron & Col.	144	144				34,462	32,999	1,463		4.4	239	229	10		4.4
Col., Hock'g V. & Tol.	320	320				195,954	170,193	25,761		15.1	612	532	80		15.1
Denver & R. G.	1,160	1,062	98		9.2	433,400	407,000	26,400		6.5	374	383		9	2.4
Det., Lan. & Nor.	226	226				91,516	116,811		25,295	21.6	405	517		112	21.6
Des M. & Ft. Dodge	138	84	54		64.3	21,573	32,074		10,501	32.9	156	382		226	59.2
Eastern	284	284				270,166	205,213	64,953		31.7	951	723	228		31.7
E. Tenn., Va. & Ga.	1,070	900	170		18.9	313,253	234,855	78,398		33.5	294	261	31		11.9
Evansv. & T. H.	146	146				50,427	57,337		6,910	12.1	344	393		49	12.6
Flint & Pere Mar.	345	345				165,150	163,883	1,267		0.8	479	475	4		0.8
Georgia	307	307				143,291	113,777	29,514		26.0	467	371	96		26.0
G'n B., Win. & St. P.	220	220				22,198	26,582		4,384	16.2	101	121		20	16.2
Gulf, Col. & S. F.	483	370	113		30.5	133,590	82,093	51,497		62.8	277	222	55		24.8
Hannibal & St. Jo.	292	292				180,887	152,691	28,196		18.4	619	523	96		18.4
Houston, E. & W. Tex.	120	88	32		36.4	21,466	15,290	6,176		41.1	179	174	5		2.9
Ill. Cen., Ill. lines	928	919	9		0.9	447,420	540,668		93,248	17.2	482	588		106	17.7
Iowa lines	402	402				121,895	156,606		34,711	22.1	303	389		86	22.1
Southern Div.	578	578				362,656	290,724	71,932		24.8	627	506	121		24.8
Ind., Bloom. & West.	695	555	140		25.2	202,931	175,756	27,175		15.4	292	317		25	7.9
Lake Erie & Western.	386	386				108,067	100,070	7,997		8.0	280	259	21		8.1
Little Rock & Ft. S.	168	168				35,392	33,973	1,419		4.2	211	202	9		4.2
Little R., Miss. R. & T.	173	156	17		10.9	32,000	18,975	13,025		68.6	185	122	63		51.6
Long Island	354	335	19		5.8	124,391	114,140	14,251		15.5	363	341	22		6.5
Louisville & Nash.	2,037	2,028	9		0.5	1,012,706	960,315	52,385		5.4	497	474	23		4.9
Marq., Hought. & Ont.	97	88	9		10.2	17,000	22,640		5,640	24.5	172	257		85	32.6
Memphis & Charles.	292	292				103,000	97,616	5,384		5.5	353	335	18		5.5
Mil., L. S. & West.	305	275	30		10.9	64,593	65,953		1,360	2.1	212	239		27	11.2
Mo. Pacific lines:															
Central Branch	387	360	27		7.5	106,647	64,433	42,214		68.8	276	179	97		53.9
Int. & Gt. Northern	775	775				293,546	210,784	82,762		39.2	379	272	107		39.2
Mo., Kan. & Tex.	1,300	1,190	110		9.2	484,424	394,672	89,752		22.7	373	332	41		12.4
Mo. Pacific	990	785	205		25.2	620,988	469,043	151,945		32.3	627	597	30		5.1
St. L., I. M. & So.	816	720	96		13.3	522,781	501,128	21,653		4.3	641	690		55	8.0
Texas & Pacific	1,400	1,140	260		22.8	416,040	278,535	137,505		49.3	297	244	53		22.1
Mobile & Ohio	528	528				172,200	158,589	13,611		8 5	326	300	26		8.5
Nash., Chat. & St. L.	539	526	13		2.4	195,203	174,974	20,289		11.6	362	332	30		9.6
N. Y. & N. England	399	396	3		0.7	231,741	217,262	14,479		6.7	581	549	32		5.8
Norfolk & Western	460	428	32		7.5	191,345	149,659	41,686		27.8	416	350	66		18.8
Northern Central	322	322				486,865	413,551	73,314		17.7	1,512	1,284	228		17.7
Northern Pacific	1,535	972	563		57.5	373,091	268,935	104,156		38.8	203	277		74	26.4
Ohio Central	232	232				76,156	53,426	22,730		42.8	326	240	98		42.8
Ohio & Miss.*	616	616				283,999	260,139	23,860		9.1	461	422	39		9.2
Ohio Southern	138	128	10		7.8	33,883	25,451	8,432		33.6	246	199	47		23.6
Pennsylvania†	2,048	1,954	94		4.7	3,712,195	3,306,730	405,465		12.5	1,813	1,720	93		5.4
Peo., Dec. & Evansv.	254	254				45,507	57,903		12,396	21.4	179	228		49	21.4
Phila. & Reading	999	994	5		0.5	1,453,862	1,290,421	163,441		12.7	1,455	1,298	157		12.1
Rich. & Danville lines:															
Char., Col. & Aug.	238	238				94,108	73,467	20,641		28.3	395	309	86		28.3
Col. & Greenville	296	296				95,615	77,272	18,343		23.8	317	261	50		21.0
Rich. & Danville	773	766	7		0.9	329,247	286,021	43,226		15.1	426	372	54		14.6
Va. Midland	352	352				113,822	94,156	19,666		20.9	324	267	55		20.4
Western N. C.	190	165	25		15.2	27,557	13,947	13,610		97.2	149	98	51		52.0
St. L., A. & T. H.															
Main Line	195	195				115,471	102,153	13,318		13.1	592	524	68		13.1
Belleville Line	121	121				62,246	56,092	6,154		10 9	514	464	50		10.9
St. Louis & Cairo	146	146				18,653	23,698		5,045	21.3	128	162		34	21.3
St. Louis & San Fran.	725	660	65		9.8	236,278	244,654		8,376	3.4	326	371		45	12.2
St. Paul & Duluth	196	196				63,472	54,202	9,270		17.2	324	277	47		17.2
St. P., Minn. & Man.	1,350	920	330		35.9	389,612	418,358		28,746	6.9	312	455		143	31.7
Scioto Valley	128	128				31,092	36,208		5,116	14.2	243	283		40	14.2
South Carolina	243	243				149,758	126,773	22,985		18.1	616	522	94		18.1
Union Pacific	4,170	3,650	520		14.3	1,590,404	1,758,834		168,430	9.6	381	482		101	21.0
Utah Central	280	280				98,880	129,482		30,602	23.5	353	462		109	23.5
Vicks. & Meridian	142	142				44,709	43,012	1,697		3.9	314	303	11		3.9
Vicks., Shreve. & P.	74	74				9,373	2,770	6,603		238.4	124	37	87		234.4
Wab., St. L. & Pacific.	3,518	3,348	170		5.1	1,079,758	1,134,768		64,010	5.6	304	336		32	9.5
West Jersey	186	168	18		10.7	62,055	52,915	9,140		17.2	334	315	19		6.0
Wisconsin Central*	390	390				90,460	79,959	10,501		13.1	232	205	27		13.1
Total, 78 roads	55,611	51,265	4,368	22		25,217,732	24,192,978	2,320,545	1,295,791		453	472		19	
Total inc. or dec			4,346		8.5			1,024,754		4.2				19	4.0

SUPPLEMENTARY TABLES.

Oregon Ry & Nav. Co.‡	2,150	1,960	190		9.7	261,700	289,284		27,584	9.5	122	148		24	16.2
Phila. & Read. Coal & Iron Co.						923,319	878,584	44,735		5.1					

* Not in table of earnings for the two months.
† Includes all lines east of Pittsburgh and Erie.
‡ Railroad, 575 miles; river and ocean lines, 1,575 miles.

RAILROAD EARNINGS, TWO MONTHS ENDING FEBRUARY 28.

NAME OF ROAD	MILEAGE. 1883.	1882.	Inc.	Dec	P. c.	EARNINGS. 1883.	1882.	Increase.	Dec.	P.c.	EARNINGS PER MILE. 1883.	1882.	Inc.	Dec.	P.c.
						$	$	$	$		$	$	$	$	
Ala. Gt. Southern	290	290				165,899	127,305	38,594		30.4	573	439	134		30.4
Bur., Cedar Rap. & No.	690	620	70		11.3	384,403	478,454		94,051	19.7	557	772		215	27.8
Central, of Georgia	726	712	14		1.9	645,700	602,739	42,961		7.1	889	846	43		5.0
Central Iowa	244	244				157,265	189,384		32,119	16.9	644	776		132	16.9
Central Pacific	2,895	2,917		22	0.7	3,142,000	3,560,144		418,144	11.7	1,085	1,220		135	11.0
Ches. & Ohio, Main Line	517	435	82		18.9	494,429	387,799	106,630		27.5	956	891	65		7.2
Eliz., Lex. & B. Sandy	130	130				103,528	55,461	48,067		86.5	796	427	369		86.5
Chi. & Alton	850	850				1,176,431	1,103,727	72,704		6.5	1,384	1,298	86		6.5
Chi. & Eastern Ill.	245	245				253,332	272,678		19,346	7.1	1,034	1,113		79	7.1
Chi., Mil. & St. Paul	4,465	4,100	365		8.9	2,617,000	2,810,911		193,911	6.9	586	690		104	15.1
Chi. & Northwestern	3,580	3,160	420		13.3	2,647,607	3,119,111		471,504	14.7	740	987		247	25.0
Chi., St. P., Minn. & O.	1,170	1,003	167		16.6	580,600	660,600		80,000	12.1	496	658		162	24.5
Chi. & West Mich.	404	367	37		10.1	197,173	219,943		22,770	10.4	488	599		111	18 5
Chi. & Gd. Trunk*	335	335				423,570	296,763	126,807		42.7	1,264	886	378		42.7
Cin., Ind., St. L. & Chi.	384	384				335,294	406,671		71,377	17.5	873	1,059		186	17.5
Cleve., Akron & Col	144	144				71,495	65,021	6,474		9.9	497	452	45		9.9
Col., Hock'g Vy. & Tol	320	320				418,101	391,192	26,909		6.8	1,307	1,222	85		6.8
Denver & Rio Grande	1,160	1,062	98		9.2	851,700	895,599		43,899	4.9	733	843		110	13.1
Det., Lan. & No.	226	226				198,171	229,650		31,479	13.7	877	1,016		139	13.7
Des M. & Ft. Dodge	138	84	54		64.3	41,591	64,899		23,308	35.8	301	773		472	61.3
Eastern	284	284				515,450	429,238	86,212		20.1	1,815	1,511	304		20.1
East Tenn., Va. & Ga.	1,070	900	170		18.9	636,494	489,457	147,037		30.1	597	544	53		9.8
Evansville & T. H.	146	146				103,498	113,553		10,055	8.8	709	778		69	8.8
Flint & Pere Marq.	345	345				355,704	331,431	24,273		7.3	1,031	961	70		7.1
Georgia	307	307				277,697	235,898	41,799		17.7	904	768	136		17.7
Grand Trunk*	2,322	2,225	97		4.4	2,787,353	2,515,301	272,082		10.8	1,200	1,130	70		6.2
Green Bay, Win. & St. P	220	220				46,023	52,082		6,059	11.6	209	237		28	11.6
Gulf, Col. & S. F.	483	370	113		30.5	295,605	183,029	112,576		61.5	612	495	117		23.4
Hannibal & St. Jo.	292	292				363,575	278,292	85,283		30.6	1,245	953	292		30.6
Houston, E. & W. Tex.	120	88	32		36.4	46,314	33,576	12,738		37 9	386	381	5		1.3
Ill. Cent., Ill. lines	924	919	5		5.4	978,682	1,128,929		150,247	13.4	1,059	1,228		169	14.0
Iowa lines	402	402				241,843	315,089		73,246	23.2	602	784		182	23.1
Southern Div	578	578				770,066	563,433	206,633		36.6	1,332	975	357		36.6
Ind., Bloom. & West.	695	555	140		25.2	451,073	371,579	79,494		21.4	649	670		21	3.1
Lake Erie & Western	386	386				239,763	226,773	12,990		5.7	621	587	34		5.7
Little Rock & Ft. Smith	168	168				90,763	71,586	19,177		26.6	540	426	114		28.3
Little R'k, Miss. R. & Tex	173	156	17		10.9	67,407	41,575	25,832		61.5	390	267	123		45.6
Long Island	354	335	19		5.8	257,647	235,733	21,914		9.3	728	704	24		3.5
Louisville & Nashv.	2,016	2,028		12	0.6	2,131,435	1,924,842	206,593		10.7	1,057	949	108		11.4
Mar., Hought. & Ont.	97	88	9		†0 2	36,203	48,081		11,878	24.7	373	546		173	31.7
Memphis & Charleston	292	292				215,906	198,731	17,265		8.7	740	681	59		8.7
Mil., Lake Sh. & West.	305	275	30		10.9	129,974	131,246		1,272	0.9	426	477		51	10.6
Mo. Pacific lines:															
Central Branch	387	360	27		7.5	218,269	129,507	88,762		68.3	564	360	204		56.7
Int. & Gt. No.	775	775				635,684	446,007	189,677		42.5	820	575	245		42.5
Mo., Kan. & Tex.	1,300	1,190	110		9.2	1,038,473	794,838	243,635		30.6	799	667	132		19.8
Mo. Pacific	990	785	205		25.2	1,353,529	1,021,719	331,810		32.9	1,367	1,302	65		5.0
St. L., Iron Mt. & So.	816	720	96		13.3	1,188,039	1,017,497	170,542		16.8	1,456	1,413	43		3.0
Texas & Pacific	1,400	1,115	285		25.8	950,569	602,522	348,047		57.7	679	540	139		25.7
Mobile & Ohio	528	528				388,808	318,265	70,543		22.2	737	603	134		22 2
Nash., Chatta. & St. L.	539	526	13		2.4	392,651	345,727	46,924		13.6	728	657	71		10.8
N. Y. & New England	399	396	3		0.7	490,007	431,103	58,904		13.7	1,228	1,089	139		12.6
Norfolk & Western	460	428	32		7.5	391,832	318,231	73,601		23.1	852	743	109		14.7
Northern Central	322	322				986,117	820,919	165,198		20.1	3,063	2,554	509		20.1
Northern Pacific	1,535	972	563		57.5	765,127	514,303	250,824		48.8	498	529		31	6.0
Ohio Central	232	232				151.738	144,280	7,458		5.2	654	622	32		5.2
Ohio Southern	138	128	10		7.8	70,936	57,501	13,435		23.2	514	449	65		14.4
Pennsylvania†	2,048	1,954	94		4.7	7,641,552	6,080,051	961,501		14 4	3,731	3,418	313		9.2
Peoria, Dec. & Evans.	254	254				95,990	125,658		29,668	23.5	378	494		116	23.5
Phila & Reading	999	994	5		0.5	3,062,637	2,793,496	269,141		9.6	3,066	2,810	256		9.1
Rich. & Danville lines:															
Char., Col. & Aug.	238	238				164,727	135,243	29,484		21.9	692	568	124		21.9
Col. & Greenville	296	296				166,692	147,840	18,852		12.7	563	499	64		12.7
Rich. & Danville	773	766	7		0.9	589,005	575,650	13,355		2.3	762	752	10		1.3
Va. Midland	352	352				210,773	170,177	40,596		23.9	599	483	116		23.9
Western N. C.	190	165	25		15.2	47,647	26,990	20,657		76.5	251	164	87		53.0
St. L., Alt. & T. Haute:															
Main Line	195	195				238,925	209,381	29,544		14.1	1,225	1,074	151		14.1
Belleville Line	121	121				132,406	123,042	9,364		7.6	1,094	1,017	77		7.6
St. L. & Cairo	146	146				49,028	56,150		7,122	12.7	366	384		48	12.7
St. L. & San Francisco	725	660	65		9.8	514,596	501,438	13,161		2.6	710	760		50	6.6
St. P. & Duluth	196	196				134,970	119,794	15,176		12.6	688	611	77		12.6
St. P., Minn. & Manitoba	1,250	920	330		35.9	879,375	813,820	65,555		8.1	703	883		180	20.4
Scioto Valley	128	128				69,707	71,961		2,254	3.1	545	562		19	3 1
South Carolina	243	243				279,191	252,240	26,951		10.7	1,149	1,038	111		10.7
Union Pacific	4,170	3,650	520		14.3	3,322,404	3,721,834		399,430	10.7	797	1,019		222	21.7
Utah Central	280	280				198,061	239,471		41,410	17.3	707	855		148	17 3
Vicksburg & Meridian	142	142				95,847	90,321	5,526		6.1	675	636	39		6.1
Wab., St. L. & Pac.	3,518	3,348	170		5.1	2,378,541	2,364,733	13,808		0.6	676	706		30	4.3
West Jersey	180	168	12		7.2	123,875	106,363	17,512		16.5	688	633	55		8.7
Total, 77 roads	57,157	52,680	4,511	34		55,361,615	52,145,577	5,450,587	2,234,549		969	990		21	
Total inc. or dec.			4,477		8.5			3,216,038		6.2				21	2.1
SUPPLEMENTARY TABLE.															
Oregon Ry. & Nav. Co‡	2,150	1,960	190		9.7	640,300	682,673		42,373	6.2	298	348		50	14.3
Phila. & Read. Coal & Iron Co.						1,874,538	1,826,975	47,563		2.6					

* Not in table of earnings for February.
† Includes all lines east of Pittsburgh and Erie.
‡ Railroad, 575 miles; river and ocean lines, 1,575 miles.

the rate of 25 miles an hour, as prescribed for the special train in question, such a locomotive could be employed without having any bad effect on the safety of the train.

As the judicial inquiry into the accident has not been completed, we can only express such opinions as to the cause of the accident as may be based on the local occurrings and investigations. The appearance of the scene of the accident, especially the circumstance that the locomotive and tender, with brakes down, had run a distance of 133 ft. outside the track in marshy meadow ground, burying itself in the latter above the axles, and that the first 10 or 12 cars behind the locomotive, tearing themselves loose from the latter, ran without any guidance from the track for about 200 ft. beyond the spot at which the locomotive had left the road, before being brought to a halt by obstacles and overturned, and also the terrible and complete destruction of the cars, justifies us in believing that the train at the moment of leaving the track, was moving at a very high rate of speed, and that either the engineman had neglected to regulate or diminish it, or that the signals possibly given by him were not observed at all, or were not observed with suitable promptitude. The actual extent of the speed attained immediately before and during the derailment of the train will be very difficult to determine, because the impressions of the passengers on the train are only subjective; and there was no speed recorder on the train. On the other hand, the judicial investigation may bring out the fact whether the engineman warned the brakemen by timely signals, and whether the latter immediately, and in accordance with the rules made for such cases, properly performed their duty.

With regard to the manner in which the derailment occurred, it is to be inferred, by reason of the above observations, either that the portion of the train following the engine, in consequence of its enormous weight, which amounted to close on 360 tons, and its high rate of speed pushed the locomotive off the track, as a result of an attempt, either by applying the brakes to the tender or by some other unknown means, suddenly to reduce the rate of speed at which it was moving; or, that the locomotive acquired on the down grade, in consequence of its excessive speed, a swinging motion from side to side that exercised a destructive effect on the normal track, whereby gradually the track was displaced in its position and its connections loosened, until the shock and strain of the blows inflicted by the wheels, not only of the locomotive, but of the entire train, on the inside of the rails of the track, increasing in severity with the increasing speed, finally forced the different portions of the track apart. The locomotive, which then when it made a new movement sideways was not guided by the track, moved then without guidance until the resistance caused by the nature of the ground, the soft meadow bottom, brought it to a halt by making its further progress impossible. The position of the locomotive and tender in the meadow ground alongside of the road without any injury save a few slight displacements of unimportant parts, as well as the bending of the rails and crooks of the track that were perceptible in advance of the actual scene of disaster, would appear to render this theory the most probable in comparison with the other. At the same time, we must not exclude from consideration the fact that both causes working together may have contributed to cause the disaster.

That the before-mentioned bendings and crooks of the rails and track may have been in existence at the place where the accident took place previous to its occurrence may be safely excluded from consideration, as shortly before the departure of the extra train a regular schedule train had passed the spot safely without derailment. If such deflections in the track had existed, even if the last-mentioned train had not suffered derailment, the train hands must have noticed such deviation in the track. In addition also to this, the track watchman had passed over his section immediately after the last-mentioned train had gone past, and had found it in good condition.

THE SCRAP HEAP.

Locomotive Building.

The Pittsburgh Locomotive Works have completed three locomotives for the new Toledo & Indianapolis road.

The Pittsburgh, Fort Wayne & Chicago shops in Allegheny, Pa., are building several new locomotives for the roads.

Manufacturing Notes.

The Western Fence Co., of Chicago, has taken a contract to furnish 360 miles of wire fence for the new Toledo, Texas & Rio Grande road. The fence will follow the track-laying and is to be finished before regular trains are put on the road.

The Lancaster Manufacturing Co. has been organized in New York with $250,000 capital stock, to make and sell the patented inventions of J. H. Lancaster, including the stocks, dies and adjustable pipe-guides; twin pipe cutters with burn scrapers; combined pipe and nut wrench; combined punch, shear, wire cutter and anvil, and others. Mr. James H. Lancaster is President; John Pickering, Treasurer; John F. Maynard, Secretary.

A company has been formed in Louisville, Ky., with $1,000,000 capital stock, to manufacture automatic train signals invented and patented by W. W. LeGrande.

The parties who have leased the Philadelphia & Reading ship-yard in Philadelphia will soon begin work on a contract for iron steamships for the Oregon Railway & Navigation Co.

The Rail Market.

Steeel Rails.—The market is quiet and steady, with prices at $38 to $40 per ton at mill. No large sales are reported.

Iron Rails.—Of iron rails the *Iron Age* says: "There is some inquiry for light rails for Southern roads, but we have not heard of any sales being made. A 4,000-ton lot of 56-lb. Welsh rails, which have been in store in New York for a long time, were sold at $28, and afterward resold to a Florida Company. Inasmuch as the last sale was part exchange, quotations cannot be given definitely."

Rail Fastenings.—Spikes are lower and are quoted at $2 to $2.10 per 100 lbs.; track-bolts, $3 25 to $3.40; fish-plates, 2 to 2.1 cents per pound.

Old Rails.—The market is quiet. Sales are reported in Philadelphia at $25 to $25.50 for tees and $27.50 for double heads.

Train Accidents in February.

The following accidents are included in our record for the month of February:

REAR COLLISIONS.

On the afternoon of the 1st a construction train employed by the Massachusetts state management, ran into a freight train of the New Haven & Northampton road, on the Troy & Greenfield road, which had stopped near the west portal of the Hoosac tunnel, in North Adams, Mass.

On the evening of the 1st, at Ontarioville, Ill., on the Chicago, Milwaukee & St. Paul road, a passenger train, while backing upon a side track in order to get out of the way of another passenger train which was approaching, was run into by the latter. The engines of both trains were demolished.

On the night of the 1st a rear collision occurred between two freight trains on the New York Central & Hudson River road, at Fairport, N. Y. One engine and 12 cars were demolished.

Very early on the morning of the 2d a freight train on the New York Central & Hudson River road ran into the wreck of another freight which had run off the adjoining track a few minutes before. A fireman was hurt.

On the 2d a freight train on the Chicago, Milwaukee & St. Paul road ran into the rear of another freight train near Savannah, Ill. An engineer and a fireman were injured.

On the 3d a freight train on the Philadelphia & Reading road ran into an ice train which was standing on the track at Hecla, Pa. The drawheads of the ice train were broken and the tank of the freight engine was lifted up on the top of the boiler.

On the 3d a rear collision occurred between two freight trains on the Columbus Hocking Valley & Toledo road, at Gore, O. An engine and a caboose were demolished.

On the night of the 4th a passenger train on the New York Central & Hudson River road ran into a freight car in the yard at Green Island, N. Y. The boiler and smokestack of the engine were demolished and the car was completely wrecked.

On the night of the 4th the second section of a passenger train on the Pittsburgh, Fort Wayne & Chicago road ran into the rear of the first section, whose engine had been ditched by a wash-out near Orrville, O. The rear car was wrecked, a trainman killed and six passengers hurt.

On the night of the 4th a freight train on the Pittsburgh, Fort Wayne & Chicago road ran into a preceding freight which had been stopped by a wash-out near Clinton, O. Several cars were damaged.

On the night of the 5th a freight train on the Vandalia Line ran into the wreck of a preceding freight, which had jumped the track at Mulberry Grove, Ill., a few minutes before, and piled up 19 cars in a very bad wreck. Two trainmen were hurt.

On the morning of the 6th a passenger train ran into a freight train on the Worcester & Nashua road at Ayer, Mass., owing to a misplaced switch. The engineer of the passenger train and one of the passengers were seriously injured. Another passenger was slightly hurt.

On the 6th, on the Nashville, Chattanooga & St. Louis road, a passenger train ran over a misplaced switch and into a freight train which had gone upon a siding, at Wartrace, Tenn. There was considerable damage to both trains.

On the afternoon of the 7th a passenger train on the Pennsylvania Railroad ran into the rear of a freight train in New Brunswick, N. J. The engine and several cars were damaged and the fireman slightly hurt.

On the 9th a freight train on the Chicago, Milwaukee & St. Paul road at Waconta, Minn., ran into the rear of another freight train, demolishing the caboose and killing a passenger.

On the evening of the 9th a freight train on the Boston & Albany road, while making a flying switch at West Brookfield, Mass., ran into another freight train. The top of the cab was knocked off.

On the morning of the 11th a passenger train on the Chicago, Burlington & Quincy ran into the rear of a freight train at Buda, Ill. The engine and a way-car were damaged.

On the night of the 12th at a station of the Missouri, Kansas & Texas road, near the South Canadian River, Indian Territory, the second section of a freight train ran into the first section, it being foggy at the time, killing a passenger and a brakeman.

On the 13th there was a rear collision between two freight trains on the Chicago, Milwaukee & St. Paul road near Frontenac, Ill. Several cars were badly damaged.

On the night of the 13th a freight train on the Albany & Susquehanna road ran into a preceding freight, at Bainbridge, N. Y., damaging several cars.

Very early on the morning of the 14th an east-bound freight train on the Pennsylvania road ran into a preceding freight at Atglen, Pa., wrecking 5 cars.

On the morning of the 14th a west-bound freight train collided with a preceding freight at Christiana, Pa., on the Pennsylvania road, wrecking a number of cars.

On the afternoon of the 14th, during a dense fog, a freight train on the Indiana, Bloomington & Western road collided with a preceding freight train at Mahamet, Ill. Several cars were wrecked.

On the night of the 16th, near the Union depot, in Cleveland, O., a misplaced switch caused a pony engine on the Lake Shore & Michigan Southern road to run into an engine on the Cleveland, Columbus, Cincinnati & Indianapolis road, which was on a side track taking water. The C., C., C. & I. engine was forced into a freight train on the siding road. One freight car was overturned and the side broken open. The other freight cars were thrown from the track.

On the night of the 19th a freight train on the Florida Transit Railroad ran into some log cars which were standing on the track three miles from Fernandina, Fla. All the cars were badly damaged, as was also the engine, which with the log cars was thrown into the ditch.

Early on the morning of the 20th, near Malden, Ill., on the Chicago, Burlington & Quincy road, one west-bound freight train ran into another which had stopped. The engine of the moving train was badly damaged and several of the cars were set on fire.

A third freight train coming east stopped in sight of the fire and was in turn run into by the train following it, with results similar to those which attended the first collision. Sixteen cars were destroyed, seven of them being burned.

On the morning of the 20th an extra engine of the Shepaug road ran into the rear of a freight train on the Danbury & Norwalk road near Danbury, Conn. The engine was badly damaged and the caboose and 4 cars were burned. Two brakemen were severely hurt.

On the night of the 20th, near Fort Wayne, Ind., on the Wabash, St. Louis & Pacific road, the rear section of a freight train, which had broken in two on a heavy grade, ran into the forward section, wrecking the caboose and other cars. The wreck took fire and two of the trainmen were burned to death.

At noon on the 22d, on the Western & Atlantic road, the rear section of a freight train ran into the forward section while the latter was standing at the depot at Marietta, Ga. The engine and two cars were badly damaged.

On the night of the 20th the detached section of a freight train on the Grand Trunk road was run into by a following freight train near Woodstock, Ont. Three cars were burned.

On the 28th a rear collision between freight trains occurred on the Baltimore & Ohio road, near Mt. Vernon, O. An engine and seven cars were destroyed.

BUTTING COLLISIONS.

On the afternoon of the 4th a butting collision occurred between two freight trains on the Lake Shore & Michigan Southern road, near La Porte, Ind. Two oil cars in the west-bound train exploded, setting fire to the wreck made by the collision.

On the morning of the 5th a passenger and a freight train on the Grand Trunk road collided near Chaudière Falls, P. Q., wrecking several cars.

On the afternoon of the 5th a butting collision between a passenger and freight train occurred on the Dayton & Michigan road, near Kirkwood, O. The engineers of both trains, the baggage-master and a fireman of the passenger train were killed. One passenger was badly scalded. The engines were a total wreck. Five freight cars and one baggage car were thrown from the track.

On the morning of the 6th a butting collision occurred between two freight trains on the Canada-Atlantic road, at Kenyon, Ont. One engineer was killed, the other seriously injured, and three other employés were slightly hurt.

On the 9th two freight trains on the Chicago, Rock Island & Pacific road collided on the bridge over the Des Moines River, at Des Moines, Ia. The trains, which were backing up toward each other, came in contact while the view of the trainmen was obscured by steam from a locomotive on the adjoining track. One brakeman was killed and three others were seriously injured.

On the 9th a butting collision occurred between two freight trains on the Fitchburg road near Zoar, Mass. Both engines and six cars were damaged.

On the night of the 13th a butting collision between a freight train and a coal train occurred on the Columbus, Hocking Valley & Toledo road, near Groveport, O. The engines were thrown from the track and badly damaged. A number of cars were damaged.

On the morning of the 14th, in a thick fog, a butting collision between two freight trains occurred on the Chicago, Burlington & Quincy road near Sandwich, Ill. Some 16 cars were totally demolished and many others were more or less damaged. One of the engineers was killed.

On the afternoon of the 14th a butting collision occurred on the Cincinnati Northern road near Cincinnati, O., between two passenger trains. One passenger was killed and five were injured.

On the morning of the 15th a locomotive of the Ulster & Delaware road and one of the West Shore road collided near the Union depot at Kingston. Two men were slightly injured.

On the evening of the 15th, during a fog, a butting collision between two passenger trains occurred on the Grand Trunk Railway near Dundas, Ont. The engines and tenders and some of the cars were demolished. An engineer and two passengers were killed. Seven passengers were wounded.

On the morning of the 18th there was a butting collision between two freight trains on the Baltimore & Ohio, in the Franklin tunnel, near Bellaire, O. Both engines and several cars were piled up in the tunnel in a very bad wreck, and the falling of some of the roof still farther complicated matters. An engineer and a fireman were killed, and three other train-men hurt. It is said that the accident was caused by an operator's failure to deliver an order.

On the 20th two engines on the New York, Lake Erie & Western road collided in the Buffalo yards, fatally injuring a fireman.

On the night of the 22d there was a butting collision between two freight trains on the Pittsburg, Fort Wayne & Chicago road, at Spring Mills, O. Both trains were badly wrecked, and an engineer and a fireman were killed.

On the morning of the 24th two freight trains collided near Newtonville, Ont., on the Grand Trunk Railway. Both engines and 20 cars were wrecked. Sixteen cars were burned.

Early on the morning of the 25th two freight trains of the New York Central & Hudson River road collided on the elevated tracks in Rochester, N. Y., owing to a misplaced switch. The locomotives and several cars were damaged. One of the engineers and a brakeman were injured.

On the night of the 28th there was a butting collision between two freight trains on the Virginia Midland road near Barbourville, Va. Both engines and several cars were wrecked, an engineer killed and six other trainmen hurt.

CROSSING COLLISIONS.

On the morning of the 2d a passenger train of the Boston & Albany road ran into a freight train of the New London Northern road, at the Know Nothing crossing in Palmer, Mass.

On the evening of the 7th a dummy engine of the Rock Island road ran into a coal train at the Western Indiana crossing, in Chicago, cutting a coal car in two. The dummy engine lost its head-light, a steam chest and a portion of the cab.

On the 14th a freight train of the Chicago, Burlington & Quincy road collided during a fog with one of the Milwaukee & St. Paul road in Chicago, Ill. An engineer, a fireman and a brakeman were injured.

DERAILMENTS, BROKEN RAIL.

On the morning of the 2d a passenger train on the Chicago and Alton road was ditched near Mexico, Mo., by a broken rail.

On the morning of the 2d, on the Toledo, Ann Arbor & Grand Trunk road, one coach of a passenger train was thrown down an embankment by a broken rail near Ann Arbor, Mich. Three persons were slightly injured.

On the 3d, on the Texas & Pacific road, a passenger train was ditched by a broken rail near Eagle Ford, Tex., and a porter was injured.

On the night of the 3d a freight train on the Charlotte, Columbia & Augusta road was wrecked by a broken rail, near Charlotte, N. C. Eleven cars were ditched.

On the morning of the 4th, nine miles north of Baraboo, Wis., on the Chicago & Northwestern road, the baggage and express car and two coaches of a passenger train were thrown from the track by a broken rail and precipitated down a 40 foot embankment into the Baraboo River, which at that point is about three feet in depth. Five of the passengers were severely cut and bruised.

On the night of the 5th a freight train consisting of a locomotive and 40 cars was thrown from the track by a broken rail nine miles east of Greenville, Ill., on the Vandaliar Line. Every lantern on the train being broken, the conductor was unable to signal an extra freight train which was closely following, and the latter ran into the débris of the train already wrecked.

On the morning of the 8th, near Winn Station, Me., on the Maine Central road, the baggage car and the express and postal car of a passenger train were thrown from the track by a broken rail and badly damaged.

On the afternoon of the 10th a passenger train on the Boston & Providence was thrown from the track near Arnold's Mills, R. I., by a broken rail.

On the evening of the 11th a passenger train on the Wabash, St. Louis & Pacific road was thrown from the track by a broken rail, near Fort Wayne, Ind. Two coaches were overturned. Four passengers were hurt, one being injured seriously.

On the morning of the 12th, a broken rail threw the smoking-car of a passenger train on the Wabash, St. Louis & Pacific road down a 15-feet embankment, near LaFayette, Ind. The car was burned and three passengers were injured.

On the morning of the 12th, two cars of a passenger train on the Alabama Great Southern road were thrown from the track by a broken rail, near Birmingham, Ala.

Early on the morning of the 14th five cars of a passenger train on the Wabash, St. Louis & Pacific road were wrecked by a broken rail, 20 miles south of Moberly, Mo.

On the night of the 15th a passenger train on the Chicago & Grand Trunk Railway struck a broken rail near Flint, Mich., ditching three coaches. One passenger was killed, one was fatally injured, and eighteen others were hurt more or less severely.

On the morning of the 16th a passenger train on the Intercolonial Railway encountered a broken rail near Mill Stream bridge, N. B. The postal car went over a bank about twenty feet high, and was badly wrecked. Two other cars and the bridge were damaged.

On the morning of the 16th a freight train on the Chicago, Milwaukee & St. Paul road was ditched near Dakota, Ill., by a broken rail.

On the morning of the 18th a passenger train on the Chicago, St. Paul, Minneapolis & Omaha road was thrown from the track near Windom, Minn., by a broken rail. Three cars went off, and two passengers were slightly hurt.

On the 19th, a freight train on the Union Pacific road was ditched seventy miles east of Denver, Col., by a broken rail. All the cars were badly damaged.

On the 21st, near Travis, Mich., on the Grand Rapids & Indiana road, a freight train broke a rail, and fourteen of the cars were piled in a heap.

On the 21st a broken rail threw thirty-five cars of a freight train from the track near Emerson, Minn., on the Chicago, St. Paul, Minneapolis & Omaha road, making a bad wreck. A brakeman was badly hurt.

On the 26th a freight train on the Wabash, St. Louis & Pacific road struck a broken rail near Peru, Ind., and 24 cars were thrown into the ditch, the engine alone passing the broken rail in safety.

On the morning of the 28th a broken rail on the New York, Lake Erie & Western road, near Cherry Creek, N. Y., caused a car of a passenger train to leave the track and turn on its side.

About noon on the 26th a car of a passenger train on the Chicago, Milwaukee & St. Paul road was thrown from the track near Worthington, Ia., by a broken rail, and upset. Two passengers were killed and the conductor hurt.

On the 28th nine cars of a freight train on the Wabash, St. Louis & Pacific road were thrown down a 15-feet embankment by a broken rail, near College View, Mo.

On the morning of the 28th several cars of a freight train on the Louisville & Nashville road were thrown from the track near Brewton, Ala., by a broken rail. A passenger was slightly hurt.

DERAILMENT, BROKEN FROG.

On the 15th several freight cars on the Wabash, St. Louis & Pacific road were thrown from the track by a broken frog at Sangamon, Ill.

DERAILMENT, BROKEN SWITCH-ROD.

On the morning of the 7th, near Maquon, Ill., on the Chicago, Burlington & Quincy road, the smoking car of a passenger train was ditched and the baggage car and forward trucks of the coach behind it left the track. The accident is supposed to have been caused by a switch-rod breaking and allowing the rails to spread as the train passed over them.

DERAILMENTS, BROKEN BRIDGE.

Early on the morning of the 4th a passenger train on the Buffalo, New York & Philadelphia road went through a bridge over Ischua Creek, 10 miles east of Olean, N. Y. The engineer and fireman were killed. The conductor and one passenger were seriously injured.

On the morning of the 13th the bridge of the Chicago, Burlington & Quincy road, near Ottawa, Ill., gave way while a freight train was passing over it and five coal cars were wrecked.

On the 16th the bridge on the Genesee Valley Canal road over Allen's Creek near Scottsville, N. Y., gave way, carrying with it the locomotive of a freight train. The engineer's arm was broken and his foot crushed. The fireman was drowned. The contractor, who built the temporary bridge which gave way, has been censured for its failure.

On the 17th a trestle on the East Tennessee, Virginia & Georgia Railroad near Atlanta, Ga., fell with a freight train. The engineer and a brakeman were killed and two passengers were seriously hurt.

On the morning of the 23d a bent of a trestle on the Louisville, Evansville & St. Louis Railway went out and let the tank of the engine of a freight train into the water. The tank was left hanging over in eight feet of water in such a way that it could not be removed until the water lowered.

DERAILMENT, SPREADING OF RAILS.

On the morning of the 14th fourteen cars of a freight train on the Indianapolis & St. Louis Road were wrecked at Charleston, Ill., by the spreading of the rails on a curve.

On the afternoon of the 16th the locomotive of a passenger train on the Pittsburgh & Western road was thrown from the track at Allegheny, Pa., by the spreading of the rails, and went over an embankment, dragging with it the tender and baggage car. The engineer and fireman were badly scalded and bruised.

On the morning of the 19th the engine, tender, baggage car and one coach of a passenger train on the Cincinnati, Hamilton & Dayton road were ditched by the spreading of the rails near Camden, O. The engine was badly damaged.

On the morning of the 28th a passenger train on the Northern Pacific road was ditched by the spreading of the rails near Wallula Junction, Wash. Ter. Two of the cars rolled down an embankment, slightly injuring three passengers.

DERAILMENTS, BROKEN WHEEL.

On the evening of the 8th the engine of a passenger train on the New York & New England road was thrown from the track near Waterville, Conn., by the breaking of a truck-wheel.

On the night of the 10th nine cars of a freight train on the Lehigh Valley road were thrown from the track near White Haven, Pa., by a broken wheel, and piled up in a bad wreck.

On the evening of the 10th a wheel under a front car of a passenger train on the Pittsburgh & Western road broke near Etna, Pa., causing the locomotive and smoking car to jump the track, the latter turning over. The engineer and fireman were scalded fatally.

On the morning of the 20th nine cars of a freight train went through the bridge at Coral Creek, Ill., on the Chicago, Burlington & Quincy road. A broken wheel caused the accident. The conductor was badly bruised.

On the afternoon of the 20th a coal train on the Belvidere Division of the Pennsylvania road was wrecked by a broken wheel near Holland's, N. J. A dozen or more cars were damaged.

DERAILMENTS—BROKEN AXLE.

On the night of the 16th a freight train on the Pittsburgh, Cincinnati & St. Louis road was wrecked by a broken axle near Mingo Junction, O. A brakeman was killed

On the morning of the 7th, on the Pittsburgh & Castle Shannon road, near Castle Shannon, Pa., an axle in the rear truck of the smoking car of a passenger train broke, and the car was left standing on the track minus its wheels, both trucks having been pulled from under it.

On the morning of the 10th several cars of a freight train on the New Jersey Southern road were thrown from the track and wrecked at Iron Mill, N. J., by a broken axle.

On the morning of the 16th, while a freight train of the New York, Lake Erie & Western road was passing through Passaic, N. J., the axle of the caboose broke and the caboose was thrown across East Main street.

On the afternoon of the 18th, near Hickory, N. C., on the Western North Carolina road, an axle under the tender of a special passenger train broke, throwing the car from the track and turning it over. Seven passengers were slightly hurt.

On the evening of the 27th a broken axle caused the wrecking of six cars of a freight train on the Scioto Valley road, at Columbus, O.

DERAILMENTS—BROKEN TRUCK.

On the 5th a car of a freight train on the New York Central & Hudson River road was thrown from the track at Cartersville, N. Y., by a broken truck.

On the night of the 9th, owing to a break of some kind in one of the trucks, the coach and baggage car of a passenger train on the Detroit, Lansing & Northern road were thrown from the track near Sheridan, Mich. The coach rolled down an embankment 12 ft., and the rear end was literally broken off. Two passengers were hurt.

DERAILMENTS, WASH-OUTS AND LAND-SLIDES.

On the morning of the 3d a bridge near Mt. Vernon, O., on the Baltimore & Ohio road, was carried away by a freshet just as a freight train was crossing, and the locomotive and 16 cars went down. A brakeman was drowned.

On the morning of the 3d a freight train on the Pittsburgh, Ft. Wayne & Chicago road ran into a wash-out near Mansfield, O., and was wrecked.

On the 4th a freight train on the Connotton Valley road was ditched by a washout near Canton, O. The engineer and fireman were killed.

On the evening of the 4th a freight train on the Pittsburgh, Cincinnati & St. Louis road ran into a wash-out near Urbana, O., and several cars were wrecked.

On the night of the 4th the engine and seven cars of a freight train on the Lake Erie Division of the Baltimore & Ohio road were wrecked near Belleville, O., by the washing away of a bridge. The engineer and fireman and a brakeman were killed.

On the night of the 4th a freight train on the Valley road ran into a wash-out near Canton, O. The engine and several cars were wrecked, the engineer and fireman killed.

On the night of the 4th a passenger train on the Pittsburgh, Fort Wayne & Chicago road went into a wash-out near Orrville, O., and the engine was wrecked.

On the night of the 4th a bridge on the Lake Shore & Michigan Southern Road near Fremont, O., was washed away just as a freight train was crossing it. The engine got over, but 20 cars went down into the river, carrying a conductor and brakeman with them. Both were drowned.

On the afternoon of the 13th a water spout which threw earth upon the track caused the derailment of a freight train on the Southern Pacific at Summer, Cal. Two engines and six cars were wrecked. The fireman was killed and two workmen hurt.

On the night of the 14th a portion of the track of the Baltimore & Ohio road at Hickman Run, Pa., where, owing to the steady rains and the rising of the river, there had been a bad slide, gave way, throwing into the river a mogul engine which was being used as a shifter and was attached at the time to an express train.

DERAILMENTS, SNOW.

On the morning of the 4th one of two locomotives of a passenger train of the Wabash, St. Louis & Pacific road ran on a switch over the snow and ice, near Sedgwick street, in Chicago, Ill., rolled into the ditch and was badly wrecked. The engineer and firemen were slightly injured.

On the night of the 6th a freight train on the St. Louis, Hannibal & Keokuk road was wrecked between Bowling Green and Cyrene, Mo., by the ice on the track.

On the afternoon of the 10th a passenger train on the Central Vermont road was thrown from the track in a snow-bank at Sutherland Falls, Vt. The road was blocked nine hours.

On the night of the 11th two engines pushing a snow-plow on the branch of the New York Central & Hudson River road between Batavia and Tonawanda struck a broken rail near Richville, N. Y., and were thrown from the track. The snow-plow and one of the engines rolled into

the ditch. The other engine remained on its wheels, but was badly damaged.

Near Morrison's Mills, N. B., on the St. John & Maine road, on the morning of the 27th the engine of a passenger train left the track owing to the rails being covered with ice.

DERAILMENTS—ACCIDENTAL OBSTRUCTION.

On the evening of the 3d the caboose of a combination train on the Lexington & Big Sandy road was thrown from the track by a hand car near Aden, Ky., and rolled down an embankment 60 feet high. One of the hands was killed and seven were severely injured.

Early on the morning of the 8th a coal train on the New York, Lake Erie & Western road broke in two near Cattaraugus, N. Y., and a draw-head fell on the track, throwing off eight cars.

On the 15th a load of telegraph poles rolled from a car of a freight train on the Canadian Pacific road near Winnipeg, Man., throwing off and damaging the cars behind it and injuring five passengers who were in the latter.

On the night of the 15th the engine and four cars of a freight train on the Chesapeake & Ohio road were thrown from the track by a rock which had slid down upon the rails, near Ivy Depot, Va.

About 5 o'clock on the morning of the 27th the breaking of a brake-beam which fell on the track caused two cars in a freight train on the Cincinnati, Indianapolis, St. Louis & Chicago road to leave the track near Indianapolis, Ind.

DERAILMENTS, CATTLE.

On the night of the 8th a material train on the Charleston & Savannah road was thrown from the track by running into a cow, near Yemassee, S. C. Two brakemen were killed.

On the evening of the 15th a switch engine of the Louisville & Nashville road was partly disabled on the Missouri avenue crossing, St. Louis, by running into a porker, which was on the track.

DERAILMENTS, MISPLACED SWITCH.

On the night of the 2d the engine and baggage car of a passenger train on the St. Louis, Keokuk & Northwestern road were thrown from the track and over a 15-ft. embankment by a misplaced switch in West Quincy, Mo., at the west end of the bridge over the Mississippi River. One other car was thrown from the track. The fireman was killed.

On the morning of the 9th a freight train on the New York, Lake Erie & Western road was thrown from the track at Rathboneville, N. Y., by a misplaced switch. Several of the cars were ditched.

Very early on the morning of the 13th a passenger train on the Louisville & Nashville road ran into an open switch 12 miles south of Birmingham, Ala., and the engine, baggage and smoking cars were badly wrecked. The engineer and a fireman were seriously hurt, and three passengers were slightly bruised.

On the night of the 22d an open switch on the New York, Lake Erie & Western road, at Middletown, N. Y., caused a freight train to run off the track.

MISCELLANEOUS DERAILMENTS.

On the night of the 5th the engine and two cars of a gravel train on the New York & New England road, at work upon South Boston flats, ran off the end of the siding and into the dock. The engineer was drowned.

Very early on the morning of the 11th a New York, Susquehanna and Western freight engine started off alone, in some unexplained manner, from the round-house at West End, N. J., and ran down to Marion Junction, and upon the tracks of the Pennsylvania Railroad, through the Bergen Cut and out on the Harsimus Cove Branch, where it went off the track at a point where workmen were taking down an old bridge to be replaced. The engine went off the bridge and was wrecked.

On the night of the 14th, on the Chicago & Alton road, several freight cars were derailed in front of the Union depot, Alton, Ill., in an attempt to make a running switch.

UNEXPLAINED DERAILMENTS.

On the morning of the 1st a freight train on the Chicago & Northwestern road ran off the track near Evanston, Ill., and caused some delay to the suburban trains of that line.

On the afternoon of the 1st, on the East Tennessee & Western North Carolina road, near Hampton, Tenn., the rear car of a passenger train left the track, rolled down the mountain side, making five complete revolutions, and feet into the Doe River in water about five feet deep. Thirteen passengers, all in the car, excepting one, were hurt.

On the 2d a freight train on the Texas & Pacific road was wrecked between Marshall, Tex., and Texarkana.

Very early on the morning of the 2d a freight train on track number three on the New York Central & Hudson River road jumped the track near Schenectady. The locomotive was broken almost to fragments and thrown across track number two, and the cars were piled up in all shapes. A freight train on track number two ran into the wreck.

On the 2d three cars and the caboose of a freight train were wrecked near Moorehead, Ky., on the Lexington & Big Sandy road.

On the 5th the caboose of a freight train on the Mobile & Girard road jumped the track and was badly wrecked, near Union Springs, Ala. The conductor was seriously injured.

On the afternoon of the 7th a freight train, while backing in the stock-yards near Forty-fifth street, Chicago, Ill., left the rails and plunged into a freight train on the adjoining track.

On the morning of the 8th a freight train on the New York, Pennsylvania & Ohio road was derailed at Mill Village, Pa.

On the 8th five cars of a freight train on the New York Central & Hudson River road left the track on the grade at Byron, N. Y.

On the night of the 8th a passenger train on the Louisville & Nashville road, some distance out from East St. Louis, Ill., ran off the track.

On the morning of the 9th the engine and four cars of a passenger train on the Savannah, Florida & Western road ran off the track near Thomasville, Ga.

On the 9th a snow plow ran off the track and went down a 25-foot embankment at Winchendon, Mass., on the Boston & Albany road.

On the 10th a freight train of twenty cars on the Grand Trunk road was ditched with considerable damage at Tyendenaga, Ont.

On the night of the 12th a passenger train on the Michigan Central road was thrown from the track at Campbell's, Mich., and five passengers were injured.

On the morning of the 14th the locomotive of a passenger train on the New York Central & Hudson River road went off the track at Fisher's station, N. Y.

On the 14th a freight train on the Wabash, St. Louis & Pacific road was thrown down an embankment near Fornshell, Mo. The engineer and fireman were killed and a telegraph repairer was scalded.

On the 15th two cars of a freight train on the Missouri Pacific road were ditched at Eureka, Mo.

On the afternoon of the 15th a passenger train on the Missouri Pacific jumped the track, near Sedalia, Mo.

On the morning of the 16th a passenger train on the Cleveland, Columbus, Cincinnati & Indianapolis road was, with the exception of the engine, ditched near Galion, O. The engine was simply derailed. Four passengers were killed. The conductor, brakeman, baggagemaster, news agent and six passengers were injured more or less seriously.

On the night of the 16th the pay car on the Pittsburgh & Western road jumped the track at Carbon Centre, Pa. The front trucks were badly broken.

On the night of the 19th while the passenger train of the St. Louis, Iron Mountain & Southern road was turning a sharp curve into Poplar street, St. Louis, the engine left the track, breaking a hole 15 feet square in the wall of an adjacent building. The baggage car was badly damaged. The fireman's arm was broken, and a boy who was stealing a ride was fatally injured.

On the 20th the truck of a box car in a freight train on the Chicago, Burlington & Quincy road jumped the track between Summitville, Ill., and New Boston.

On the afternoon of the 21st, at the Short Line junction in South Louisville, Ky., on the Louisville & Nashville, a freight train of seven cars was derailed on a siding and all the cars were thrown on the main track, splintering seven freight cars.

On the afternoon of the 23d a coal car on the Genesee Valley road jumped the track near Portage, N. Y.

On the night of the 23d there was a wreck of loaded coal cars on the Clearfield Branch of the Pennsylvania road, near Curwensville, Pa.

On the 26th, on the Oregon Short Line, 25 miles east of Neosha Junction, Wy., a passenger car jumped the track and was badly wrecked. Three passengers were killed and five were wounded.

On the 26th a freight train ran off the track at Troy, O., on the Eastern Division of the Indiana, Bloomington & Western road.

On the morning of the 27th the engine and two cars of a passenger train on the Chesapeake & Ohio road ran off the track near Newport News, Va. Two passengers were slightly hurt.

On the 27th eight cars in a Texas & Pacific freight train were wrecked near Dallas, Tex. Two trainmen were injured and one was killed.

On the afternoon of the 27th the rear car of a passenger train on the Pittsburgh, Fort Wayne & Chicago road jumped the track on the bridge at Archer avenue in Chicago, Ill., but was not damaged.

On the morning of the 28th a freight train on the Chicago & Alton road jumped the track on the bridge at Wilmington, Ill. One span of the bridge was knocked into the river, and carried with it four empty and two loaded cars.

At noon on the 28th three cars of a passenger train on the Chicago & Northwestern road were ditched at Palatine, Ill. One child was killed and about twelve passengers were slightly injured.

On the 28th a car loaded with horses on the Wabash, St. Louis & Pacific road left the rails near St. Louis and turned on its side.

On the 28th eight cars of lumber in a train on the Texas Pacific road were wrecked near Dallas, Tex.

On the night of the 28th a car in a freight train on the Rome, Watertown & Ogdensburg road left the track near Adams, N. Y. The derailed car in crossing a bridge 200 feet long cut off the spike-heads and over 1,000 fish-plate bolts and broke the ties badly.

About the 28th a New York Central and a Cayuga Lake train ran a race on the parallel tracks east of the station in Cayuga, N. Y. The result was that three passenger coaches, a baggage car and the locomotive of the Cayuga Lake train went off the track, striking the west end of the depot.

BROKEN CONNECTING ROD.

On the night of the 3d, near Hannibal, Mo., on the Hannibal & St. Joseph road, one of the side rods of the locomotive of a passenger train broke, demolishing the cab and badly bruising the engineer.

On the night of the 8th, near Basket, Pa., on the New York, Lake Erie & Western road, one of the side rods of the engine of a passenger train broke, and revolving struck and completely demolished one side of the cab.

On the 13th a connecting rod of the engine of a passenger train on the Long Island road broke at Whitestone, N. Y., and the engine was damaged.

On the 14th the locomotive of a passenger train on the New York Central & Hudson River road, broke both parallel rods at Fisher's, N. Y., and the engine was damaged.

On the 15th the engine of a passenger train on the New York, Lake Erie & Western road broke both side rods, near Port Jervis, N. Y., and was badly damaged.

On the night of the 18th, near Otisville, on the New York, Lake Erie & Western road, the side rods of the engine of a passenger train broke. The engine became detached from the tender and was very badly damaged.

On the morning of the 19th, on the New York, New Haven & Hartford road, near Stamford, Conn., the side rod of the engine of a passenger train broke, damaging the engine.

On the night of the 25th, near Oriskany, N. Y., on the New York Central & Hudson River road, one of the parallel rods of the engine of a passenger train broke. The engineer was slightly hurt.

OTHER ACCIDENTS.

Early on the morning of the 2d the engine of a freight train on the New York, Lake Erie & Western road broke loose from the tender near Otisville, N. Y. The fireman, who was standing on the sheet-iron platform between the engine and tender, fell upon the track and was killed.

On the morning of the 5th, near Semonauk, Ill., on the Chicago, Burlington & Quincy road, the engine of a passenger train broke a driving axle, and both side rods were bent in the same direction.

On the morning of the 7th an engine of the Third Avenue line of the New York Elevated Railroad while rounding the Coenties' Slip curve broke the axle of the trailing drivers.

On the morning of the 13th the cylinder head of a passenger train on the New York Central road blew out at Rome, N. Y., and on stopping the train the other cylinder was found to be on a dead centre.

On the 14th the tire on one of the driving-wheels of the locomotive of a passenger train on the Intercolonial Railway broke near Moncton, N. B.

Early on the morning of the 17th a sleeping car on a Wabash, St. Louis & Pacific road caught fire when near Lexington Junction, Mo. The train stopped at the junction and all the passengers got out safely, but the car was destroyed.

On the night of the 18th one of the piston-rods of the engine of a passenger train on the New York, Lake Erie & Western road broke near Hampton, N. Y., punching a hole in the cylinder head. The engine ran into Port Jervis with the disabled side disconnected.

On the afternoon of the 21st the locomotive of a freight train on the New York Central & Hudson River road broke a tender wheel near Coldwater, N. Y.

On the morning of the 23d, in the Newburg yard of the New York, Lake Erie & Western road, a locomotive crashed into the elevated iron structure by which the West Shore track crosses the yard, knocking down a large iron column and three heavy girders. The top was torn off the locomotive's smoke-stack, the sand box, steam-drum and cab were ripped to pieces and the tender was badly damaged. The engineer fell from his engine and was stunned. The engine was engaged in pushing coal cars in order to give them sufficient momentum to carry them up an incline and into a coal yard lying beyond the elevated structure, the latter not being high enough to allow locomotives to pass under it. In this instance when the cars were cut loose the engine failed to respond to the reversal of the lever, but kept on its way with the consequences stated.

On the 27th a freight car on the New York, Lake Erie & Western road took fire in an unexplained manner near Wellsburg, N. Y., and was totally destroyed.

On the morning of the 28th the axle and one of the forward wheels of the engine of a passenger train on the Rome, Watertown & Ogdensburg road broke at Ontario, N. Y.

SUMMARY.

This is a total of 184 accidents, whereby 61 persons were killed and 186 injured; an increase of 96 accidents, of 38 killed, and of 117 injured, as compared with February of last year.

The two months of the current year show a total of 352 accidents, 116 killed and 385 injured; a monthly average of 176 accidents, 58 killed and 192 injured.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Chicago, Burlington & Quincy, annual meeting, at the office in Chicago, April 25, at 11 a. m.

Ithaca, Auburn & Western, special meeting, April 26, to vote on a proposed lease of the road.

Long Island, annual meeting, at the office in Long Island City, N. Y., April 10.

Lake Shore & Michigan Southern, annual meeting, at the office in Cleveland, O., May 2. Transfer books close March 30.

Michigan Central, annual meeting, at the office in Detroit, Mich., May 3. Transfer books close March 30.

New York, Susquehanna & Western, annual meeting, at the Windsor Hotel in Jersey City, N. J., May 3, at noon.

Panama, annual meeting, at the office, 37 Wall street, New York, April 9, at noon.

Pensacola & Atlantic, annual meeting, in Pensacola, Fla., April 11, at noon.

Vicksburg & Meridian, annual meeting, at the office, No. 35 William street, New York, May 7.

Technical Meetings and Conventions.

The April meeting of the *Master Car-Builder's Club* will be held at the rooms, No. 113 Liberty street, New York, April 19, at 8 p. m. The subjects for discussion are: Draw-gear, Dead-blocks and Car-trucks. All interested are invited to attend.

The *Master Car-Builders' Association* will hold its annual convention in Chicago, beginning June 12 next. The meeting will be held in the Grand Pacific Hotel. The charge at that hotel to members will be $3 per day for ordinary rooms.

The *Master Mechanics' Association* will hold its annual convention in Chicago, June 19 next.

Railroad Conventions.

The *General Time Convention* will hold its spring meeting at the Lindell House in St. Louis, April 11.

The *Southern Time Convention* will meet at the National Railway Club Rooms, No. 46 Bond street, New York, April 18.

The *Car Accountants' Association* will hold its annual convention in Philadelphia, May 22.

The *General Baggage Agents' Association* will hold its next semi-annual meeting at the Tremont House, Chicago, Aug. 8.

Dividends.

Dividends have been declared as follows:

Berkshire (lease to Housatonic), 1¾ per cent., quarterly, payable April 2.

Cincinnati, Indianapolis, St. Louis & Chicago, 1½ per cent., quarterly, payable April 16.

Cumberland Valley, 2½ per cent., quarterly, payable April 2.

Delaware, Lackawanna & Western, 2 per cent., quarterly, payable April 20. Transfer books close April 5.

European & North American (leased to Maine Central), 2½ per cent., semi-annual, payable April 2.

Housatonic, 2 per cent., quarterly, on preferred stock, payable April 16.

Nashua & Rochester (leased to Worcester & Nashua), 1½ per cent., semi-annual, payable April 2.

New London Northern, 1½ per cent., quarterly, payable April 2.

Pittsburgh, Fort Wayne & Chicago (leased to Pennsylvania Company), 1¾ per cent., quarterly, on special stock payable April 2; 1¾ per cent., quarterly, on regular stock, payable April 3.

Sioux City & Pacific, 3½ per cent., semi-annual, on preferred stock, payable April 5.

United New Jersey (leased to Pennsylvania Railroad Co.), 2½ per cent., quarterly, payable April 10.

Vermont & Massachusetts (leased to Fitchburg), 3 per cent., semi-annual, payable April 7.

Foreclosure Sales.

The *New York & Sea Beach* road was sold in New York, April 4, and bought in for account of the bondholders for $245,000, the purchasers assuming a land mortgage of $30,000 in addition. The property includes the road from Bay Ridge to Coney Island, 6 miles, the dock and terminus at Bay Ridge, and the hotel property on Coney Island. The bondholders have made an agreement for the reorganization of the company.

The *Washington & Western* road was offered for sale in Alexandria, Va., April 4. Two bids were received, one of $350,000 and one of $345,000, but the commissioners refused to accept either, and adjourned the sale until May 9.

The *Nantasket Beach* road will be sold in Boston, June 27, by the trustee, who has taken possession of the road on account of default in interest on the bonds. It is a narrow-gauge road connecting the summer resorts on Nantasket Beach with the steamboat landings and the Old Colony road.

Southwestern Railway Association.

A dispatch from Chicago, April 4, says: "The Southwestern Railway Association met to-day for the purpose of reorganizing the Missouri River pool. For some time there has been misunderstanding between the Chicago and St. Louis lines concerning the division of the traffic. The Chicago roads claimed that they were entitled to more than 55 per cent. allowed under the ruling agreement. After a long and animated discussion, at which all the roads interested were represented, it was resolved to reorganize the pool and

abolish the divisions, putting into the pool all the business between Chicago and Missouri River points, and between St. Louis and the same, Omaha and Council Bluffs excepted. The following percentages were agreed upon: Chicago & Alton, 24 per cent.; Wabash, 24; Burlington & Quincy, 20; Missouri Pacific, 14; Rock Island, 14; Hannibal & St. Joseph, 4. In addition, the Missouri Pacific is to get 6 per cent. of the gross pool for the business it brings into the pool from points southwest of Kansas City. A stated money consideration is to be given monthly to the Kansas City, St. Joseph & Council Bluffs road, to be paid out of the joint pool."

ELECTIONS AND APPOINTMENTS.

American Steamship Co.—At the annual meeting in Philadelphia, April 3, the following directors were chosen: Henry D. Welsh, President; John Price Wetherill, D. B. Cummins, N. Parker Shortridge, Strickland Kneass, William D. Winsor, G. B. Roberts, Henry C. Butcher, J. N. DuBarry, Joseph W. Lewis, Edmund Smith.

Atlantic & Pacific.—The following circular is dated Albuquerque, N. M., March 27:

"Mr. Lewis Kingman, Chief Engineer, having resigned his position with this company to become Chief Engineer of the Mexican Central Railway of Mexico, Mr. W. A. Drake is hereby appointed Acting Chief Engineer. All employés in Construction and Maintenance of Way departments will remain in their present positions and report to him, unless otherwise ordered. In effect April 1, 1883."

Mr. Drake has been with Mr. Kingman four years on the Atchison, Topeka & Santa Fe and the Atlantic & Pacific roads, and is an engineer of experience and capacity.

Boston, Hoosac Tunnel & Western.—Mr. A. S. Crane is appointed General Freight and Passenger Agent in place of J. Wilder, resigned.

Buffalo Creek.—Mr. R. F. Goodman has been appointed General Superintendent. He will also retain his office as General Manager of the Lehigh Valley Transportation Co.

Carthage & Adirondack.—This new company has chosen the following directors: Samuel Q. Brown, Samuel Dickson, Philadelphia; Thomas B. Ryder, Harrisburg, Pa.; Josephus Collett, Terre Haute, Ind.; Cadwell B. Benson, Oswego, N. Y.; William A. Sweet, Syracuse, N. Y.; O. L. Hascy, Alanson A. Sumner, Albany, N. Y.; M. Lombard, New York; Byron D. Benson, Robert D. Benson, Titusville, Pa.; George Gilbert, Carthage, N. Y.; Joseph Pabud, Harrisville, N. Y.

Chicago, Milwaukee & St Paul.—General Manager S. S. Merrill has just issued the following circular: Mr. Roswell Miller has been appointed assistant to the Manager. All orders from him will be respected." Mr. Miller for the last year or two has occupied the position of Vice-President and Treasurer of the Western Indiana, and has also for a time been acting General Manager. He was at one time on the Cairo & Vincennes road.

Chicago Belt.—At a meeting held in Chicago, March 31, the following directors were chosen: E. B. Stahlman, S. R. Callaway, D. J. Mackey, George L. Dunlap, Robert Harris. The board elected S. R. Callaway President; Andrew Crawford, Vice-President; James Walsh, General Manager; A. S. Dunham, Secretary; G. W. Stokes, Treasurer. The officers are the same as the Chicago & Western Indiana.

Chicago, Rock Island & Pacific.—General Superintendent A. Kimball has issued the following circular:

"The following changes and appointments will take effect April 1: The office of General Superintendent is changed from Davenport to Chicago. H. F. Royce is appointed Assistant General Superintendent, with office in Davenport. John Givin is appointed Superintendent of the Iowa and Keokuk & Des Moines Divisions, with office in Des Moines. John C. Coombs is appointed Assistant Superintendent of the Keokuk & Des Moines Division, with office in Keokuk."

Mr. Royce has been connected with the road since 1868, and for twelve years has represented the company at Des Moines. Mr. Givin has been Superintendent of the Keokuk & Des Moines Division ever since it was leased by this company.

Chicago & Alton.—This company has issued the following circular: "Mr. O. Vaughan having resigned as Superintendent of the Kansas City Division of the Chicago & Alton, that division will be consolidated April 1, 1883, with the St. Louis Division. Mr. T. M. Bates is appointed Superintendent of both divisions, to take effect on that date, with headquarters at Roodhouse."

Cincinnati & Muskingum Valley.—At the annual meeting in Zanesville, O., March 27, the following directors were chosen: Thomas D. Messler, George B. Roberts, Charles Moran, James Buckingham, M. Church, James Hardman, W. A. Graham. The board elected Thomas D. Messler President; W. F. Black, Secretary and Treasurer. The road is leased to the Pittsburgh, Cincinnati & St. Louis.

Columbus & Midland.—This new company has elected Orland Smith, President; Edgar M. Johnson, Vice-President; James A. Wilcox, Secretary and Treasurer.

East Tennessee, Virginia & Georgia.—The following reorganization of the divisions of this road took effect on April 1:

1. The Georgia Division as it at present exists will be abolished.

2. That part of the line lying between Atlanta Junction and Cleveland will, from April 1, form part of the Alabama Division and will be under the direct control of J. M. Bridges, Superintendent Alabama Division.

3. That portion of line lying between Atlanta Junction and Macon, Ga., will be known as the Atlanta Division and will be in charge of Mr. T. D. Kline, who is appointed Division Superintendent, to take effect April 1.

4. The line from Macon to Brunswick, including Macon proper, will be known as the Brunswick Division and will be in charge of J. E. Mallory, who is appointed Division Superintendent, to take effect April 1.

5. The Ooltewah Cut-Off will, from April 1, form part of the East Tennessee Division, and will be controlled by the Superintendent of that division.

6. Cleveland agency and yard will be in East Tennessee Division; Cohuttah agency and yard and Rome agency and yard in the Alabama Division; Macon agency and yard in the Brunswick Division.

Trainmen, while in yards of other divisions than those on which they run, will be governed by the regulations of the division superintendent controlling such division.

7. The terminus for freight trains on Atlanta Division will be East Rome; for passenger trains Rome proper; but north of Atlanta Junction all trains will be run under such regulations as the Superintendent of Alabama Division may prescribe.

Eureka Springs.—This company has elected officers as follows: President, R. C. Kerens, St. Louis; Vice President and General Manager, Powell Clayton, Little Rock, Ark.; Secretary, B. Baer, Fort Smith, Ark.; Treasurer, Logan H. Roots, Little Rock.

Louisville, New Albany & Chicago.—Mr. T. L. Waggener having resigned the position of Trackmaster of the North Division, Mr. J. A. Rodgers has been appointed Trackmaster of both the North and South divisions from April 1.

Mexican Central.—At the annual meeting in Boston, April 2, the following 17 directors were chosen, two others being appointed by the Mexican government: Thomas Nickerson, William Rotch, Charles J. Paine, F. L. Ames, Frank Morison, Royal M. Pulsifer, Albert W. Nickerson, Theodore Nickerson, Levi C. Wade, Andrew B. Lawrie, Benjamin P. Cheney and Isaac T. Burr, of Boston; Levi Z. Leiter, of Chicago; Robert R. Symon, of New York; Rudolph Fink, Sebastian Camacho and Ramon G. Guzman, of Mexico. Subsequently the directors met and organized by the re-election of the old officers.

Michigan Central.—Mr. E. H. Phelps has been appointed Chief Engineer, with headquarters at Detroit. Mr. Allen Bourn has been appointed Purchasing Agent of this road, and will have charge of all purchases of lumber and timber. Mr. A. F. Howland has been appointed Fuel Agent, and will have charge of purchasing and handling of fuel and purchasing of ties and fence-posts.

Missouri Pacific.—The new board has elected Jay Gould President; R. S. Hays, First Vice-President; A. L. Hopkins, Second Vice-President; H. M. Hoxie, Third Vice-President; A. H. Calef, Secretary and Treasurer; D. S. H. Smith, Assistant Secretary and Treasurer at St. Louis.

From April 1 the duties of D. Brock, Master of Transportation, are extended over the St. Louis, Iron Mountain & Southern Railway, Texas & Pacific Railway and International & Great Northern Railroad. He will have charge of the distribution of car equipment, which will be made by him through division superintendents' offices, and will perform such other duties as may be assigned to him by the General Transportation Manager.

New York, Lake Erie & Western.—Mr. W. H. Hurlburt has been appointed General Western Passenger Agent, with office in Chicago. He was recently Eastern Passenger Agent for the Canada Southern.

New York & New England.—Mr. W. G. Tabor is appointed Master Mechanic of the Eastern Division in place of C. B. Moore, resigned.

Oatka Valley.—This new company has elected officers as follows: President, John J. Carter, Titusville, Pa.; Vice-President, Wm. Bristol, Warsaw, N. Y.; Secretary, L. N. Hayward, Warsaw, N. Y.; Treasurer, G. A. Eckbert, Buffalo, N. Y.; Chief Engineer, N. S. Beardslee, Warsaw, N. Y.

Ohio & Mississipi.—The office and headquarters of the Mr. J. H. Setchell, General Master Mechanic, have been removed from Vincennes, Ind., to Cincinnati, O. All communications intended for that office should be addressed to Cincinnati.

Portage & Cuba.—This company has elected officers as follows: President, R. G. Taylor, Buffalo, N. Y.; Vice-President, N. S. Beardslee, Warsaw, N. Y.; Secretary and Treasurer, V. D. Loomis, Attica, N. Y.

Silver City, Deming & Pacific.—Mr. John W. Smith has been appointed General Superintendent of this line. The office is at Silver City, New Mexico.

Staten Island.—At the annual meeting April 3, the following directors were chosen: B. Kreischer, George F. Kreischer, George P. Ockershausen, Nathaniel Marsh, Erastus Wiman, John Mass, James M. Nichols, Adolph L. King, Wm. King, Henry Adams, Walter T. Elliott, George Law, Jr., John W. Mersereau. A majority of the board are new directors. The board elected Erastus Wiman, President; N. C. Miller, Vice-President; John I. Stephens, Secretrry and Treasurer.

St. Louis & Cairo.—At the annual meeting in Chicago last week the following directors, one-third of the board, were chosen for three years: Wm. F. Whitehouse, Chicago; J. A. Horsey, Extine Norton, New York.

St. Louis, Iron Mountain & Southern.—The board has elected Jay Gould President; R. S. Hays, First Vice-President; A. L. Hopkins, Second Vice-President; H. M. Hoxie, Third Vice-President; A. H. Calef, Secretary and Treasurer; S. D. Barlow, Assistant Secretary; D. S. H. Smith, Assistant Treasurer.

Woodruff Sleeping & Parlor Coach Co.—Mr. J. C. Paul has been appointed by the board of directors General Superintendent of this company, with headquarters at No. 115 Broadway, New York city. Appointment took effect April 1.

PERSONAL.

—Mr. O. Vaughan has resigned his position as Superintendent of the Kansas City Division of the Chicago & Alton road.

—Mr. B. F. Tichenor, for some time General Agent of the Wabash, St. Louis & Pacific in Chicago, died in that city last week.

—Mr. George Pandely has resigned his position as Superintendent of Morgan's Louisiana & Texas road, to go into other business.

—Mr. T. L. Waggener has resigned his position as Track master of the North Division of the Louisville, New Albany & Chicago road.

—Mr. J. Wilder, for some time General Freight and Passenger Agent of the Boston, Hoosac Tunnel & Western road, has resigned his position.

—Mr. Joseph A. Dodge, for many years Superintendent and recently General Manager of the Boston, Concord & Montreal road, has resigned on account of his health. He will take up his residence in California.

—Mr. Lewis Kingman has resigned his position as Chief Engineer of the Atlantic & Pacific Railroad to accept a similar position on the Mexican Central. Mr. Kingman served on the Atchison, Topeka & Santa Fé before taking charge of the Atlantic & Pacific, and has had extensive experience in the construction of railroads in the Southwest.

—The Chicago *Tribune* says: "Mr. W. H. Clark has resigned the position of private secretary to the General Freight Agent of the Chicago, Burlington & Quincy. He will now try to gain distinction as an opera singer. Mr. Clark has an excellent basso voice. He has frequently appeared in the Chicago Church Choir Company and other local operatic organizations."

The venerable Peter Cooper died at his residence in New York, April 4, aged 92 years. Mr. Cooper's life and work are too well known to need extended notice here. His connection with railroads has not been extensive, and was chiefly confined to his interest in the early construction of the Baltimore & Ohio, and to the locomotive which he built and tried on that road, and which was probably the earliest American locomotive.

—Mr. David E. Small, Senior Member and President of the Billmeyer & Small Co., died at his home in York, Pa., March 25, aged 58 years. Mr. Small was born in York in 1824, and after serving an apprenticeship in business went into partnership with his father in the lumber business. Some years later, in company with the late Charles Billmeyer, he commenced the business of manufacturing cars, the firm name being Billmeyer & Small. In 1876, after the death of Mr. Billmeyer, the present corporation was formed, and Mr. Small was chosen President. He was an active and upright man of business, highly esteemed by his friends and townsmen, and held many local positions of trust.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1883.	1882	Inc. or Dec	P. c.
Three months ending March 31:				
Cin., Ind., St. L. & Chi. ..	$565,712	$606,394	D. $42,6 2	7.0
Denver & Rio Grande.....	1,373,300	1,417,199	D. 43,899	3.1
Mil., Lake Shore & West..	288,060	261,514	I. 1,546	0.8
Union Pacific.....	5,657,404	5,946,824	D. 289 430	4.8
Two months ending Feb. 28:				
Northern Central.....	$986,117	$820,919	I. $165,198	20.1
Net earnings.....	287,931	214,419	I. 73,512	34.3
West Jersey.....	123,875	106,363	I. 17,512	16.5
Net earnings.....	41,577	39,452	I. 2,125	5.4
Month of February:				
Northern Central.....	$486,865	$413,551	I. $73,314	17.7
Net earnings.....	129,712	121,810	I. 7,902	6 5
West Jersey.....	62,055	52,915	I. 9,140	17 2
Net earnings.....	20,003	19,352	I. 651	3.4
Month of March:				
Cin., Ind., St. L. & Chi....	$230,418	$201,763	I. $28,665	14.2
Denver & Rio Grande.....	521,900	521,500	I. 100	0.2
Mil., Lake Shore & West..	78,086	75,288	I. 2,818	3 7
Union Pacific.....	2,335,000	2,225,000	I. 110,000	4.9

Grain Movement.

For the week ending March 24 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past seven years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts.
1877	1,844,306	1,182,741	1,423,453
1878.....	4,339,889	2,528,517	4,149,897
1879.....	3,030,710	2,890,223	4,383,816
1880.....	4,912,230	4,172,194	5,850,868
1881.....	2,906,494	2,046,187	5,372,157
1882.....	2,204,654	1,425,283	1,303,314
1883.....	5,450,982	2,793,396	4,235,516

Thus the receipts of the Northwestern markets for the week were larger this year than in the corresponding week of any preceding year, and 3,246,000 bushels (147 per cent.) more than last year. They were, however, 572,000 bushels less than in the previous week of this year, and show a still greater decrease compared with the unexpected receipts of the two weeks previous.

The shipments of these markets were nearly twice as great as in the corresponding week of last year, but were one-third less than in 1880 and a little less than in 1870. There were also 861,000 bushels less than in the previous week of this year, and the smallest for six weeks. This decrease from the previous week was not shown in the shipments from Chicago, which were nearly the same, so that we may suppose it to be from the more southern markets. Of the total shipments, 284,099 bushels (10.2 per cent.) went down the Mississippi—the smallest for four weeks.

The Atlantic receipts for the week were more than three times as great as last year, when they were extraordinarily small, but were less than in either of the three previous years. They were 212,000 bushels less than the week before.

While there was a decrease of 572,000 bushels in Northwestern receipts compared with the week before, there was an increase of 192,000 bushels at St. Louis, whose receipts were larger than ever before except in the last week of July, 1880. There was a decrease of 439,000 bushels (17 per cent.) at Chicago, of 172,000 (38 per cent.) at Milwaukee, and of 91,000 (41 per cent.) at Detroit. The falling off is in wheat and oats, which come largely from the more northern districts, while the corn receipts do not decrease.

The receipts at New York have changed very little for four weeks. Boston in the week of March 24 received more than in any previous week this year or since February, 1882. And there were but two weeks in 1881 (in June when its receipts were so large. In 1880 there were six, in 1879 three. On the other hand, the receipts at Philadelphia were the smallest for six weeks and with one exception the smallest of the year, and the Baltimore receipts the smallest for eight weeks. The receipts at New Orleans, though but 98,000 bushels more than the week before, were the largest since September, and have been exceeded only in the last week of September, 1882, the last week of April, 1881, and the last week of January, 1880. Its exports for the week were 882,130 bushels, which is probably more than ever before.

For the week ending March 26, exports of Atlantic ports have been:

	1881.	1882.	1883.
Flour, bbls.....	129,789	90,211	101,252
Grain, bu. 4,316,444		1,434,153	3,443,497

Though much more than last year, the exports were much less than 1881.

Coal.

Coal tonnages for the week ending March 24 are reported as follows:

	1883.	1882.	Inc. or Dec.	P. c.
Anthracite.....	701,081	403,111	I. 297,980	73.9
Semi-bituminous.....	113,637	80,473	I. 33,164	41 2
Bituminous, Penna..	65,895	65,702	I. 193	0.3
Coke, Penna.....	56,334	63,318	D. 6,984	11.0

The anthracite companies have, it is said, reached an agreement to stop work six days in each month until September, unless there should appear to be an extraordinary demand for coal, which is not anticipated at present.

Cumberland coal tonnage for the three months ending March 31 is reported by the Cumberland *Civilian* as follows:

Shipments from mines:	Tons.
Cumberland & Pennsylvania R. R....	319,280
George's Creek & Cumberland.	72,234
West Virginia Central & Pittsburgh.....	60,709
Direct from mines to Baltimore & Ohio.....	1,635
Total.	453,869
Disposition of shipments:	
To Baltimore & Ohio R. R	332,926
" Bedford Div., Pennsylvania R. R.....	91,887
" Chesapeake & Ohio Canal..	24,867
" local trade.....	4,187
Total.....	453,867

Shipments over the George's Creek & Cumberland road show an increase of 23,959 tons, or 49.9 per cent. Over Cumberland & Pennsylvania there was a decrease of 40,089 tons, or 11.1 per cent.

The coal tonnage of the Pennsylvania Railroad for the week ending March 24, was as follows:

	Line of road.	From other roads.	Total.
Coal	140,569	42,874	183,443
Coke	47,920	8,414	56,334
Total	188,489	51,288	239,777

The total tonnage this year to March 24 was 2,776,311 tons; in 1882 it was 2,517,464; increase, 258,847 tons, or 10.3 per cent.

Mississippi River Exports.

The St. Louis *Globe-Democrat* says:

"The shipments by the barge line for export from St. Louis alone amounts to one-third the entire east-bound tonnage which passes through Chicago from the North and West. This is merely a fraction of the export business handled by the local merchants, who have contracts with steamship agents to supply a specific tonnage each week at Boston, New York, Baltimore, Newport News and even as far east as Portland. The establishment of a regular branch of the Harrison Steamship Line to leave New Orleans at stated periods does not begin to convey an adequate impression of the extent of the export trade. The Harrisons send out from New Orleans during nine months of the year three steamships per week loaded with miscellaneous cargoes, besides the freights that are taken by other sail and steam vessels. At one time last week there were seven steamers in New Orleans harbor clearing for foreign ports. Six of these vessels were receiving grain from floating elevators, and the seventh was alongside the main elevator taking in St. Louis grain. An inquiry from Capt. Haarstick, of the barge line, for space to load 2,200 tierces of lard on any steamship was answered by telegraph to the effect that tonnage for heavy freight had been engaged for March and April, and nothing could be received before May. The statistics of the St. Louis Freight Bureau show that in twenty business days of March nineteen steamships cleared from New Orleans for European ports, irrespective of the departures for the Mediterranean, South America and the West Indies. From the books of the St. Louis & Mississippi Valley Transportation Company the following figures were taken to show the actual export movement from St. Louis via the Gulf between Feb. 21 and March 25: Total tonnage, 81,572, consisting of 9,080 tons of packages and 72,492 tons of bulk freight. The bills comprised the following: 240 barrels beer, 9,113 sacks bran, 29,234 sacks oats, 5,400 of corn, 2,264 of malt, 5,779 barrels of meal, 30,501 of flour, 1,745 of pork, 735 tons of hay, 778,168 pounds lard, 1,000 pounds hams, 175,600 of meats, 170,800 of white lead, 2,179 packages merchandise, 1,806,590 bushels of corn and 683,582 bushels of wheat."

The Chicago-St. Louis Pool.

The Chicago & Alton Co. has served notice of its withdrawal from the Chicago-St. Louis pool passenger and from the agreement not to issue passes to shippers. The reason given is that the agreement has been violated by others.

The Joint Westward and the Colorado Classification.

The Joint Westward Classification Committee and the representatives of the Colorado roads held another meeting in Chicago last week to put the finishing touches to the new harmonized classification they have been arranging during the last week. Heretofore the roads west of the Missouri have worked under a classification different from that of the roads east of the Missouri, using the joint westward classification. This not only caused great annoyance and injury to the shippers, especially those sending goods from Chicago and St. Louis to points beyond the Missouri River, but also embarrassed the roads in settling their accounts. This meeting, was, therefore, called to try to harmonize the two classifications and make them correspond as nearly as possible. The work of the meeting has been a most laborious one, as several thousand articles had to be gone through and considered seriatim, but the task has finally been accomplished and the two classifications have been so harmonized that there is that there is now hardly a difference between them. Both sides have made concessions to bring about this desirable result.

Rates on California Fruit and Vegetables.

A circular just issued by the Central Pacific in connection with the Union Pacific and its connecting lines announces that until further notice, when shipments are offered subject to the subjoined rules and conditions, the Central Pacific will guarantee the following rates of freight on fruit and vegetables in car-loads not less than 20,000 pounds or more than 25,000 pounds by freight trains, and not more than 24,000 pounds by passenger trains. When refrigerator cars are used, not to exceed one ton of ice, if necessary to preserve the contents, will be allowed to pass free of charge, provided that the contents of the car, including ice and other preservatives or packing shall not exceed 22,000 pounds. Excess of 22,000 pounds in one car, when loaded by shipper, will be charged double rates. The allowance for tare or weight will not exceed 24,000 pounds.

The rates will be as follows:

From San Francisco, Sacramento, Oakland, San Jose, Marysville and Stockton to:

	By Freight Train per 100 lbs.		By Passenger Train per 100 lbs.
	Vegetables.	Green fruit.	Green fruit, vegetables.
Omaha	$1.35	$1.75	$3.50
Council B. & Kan. City	1.40	1.80	3.55
St. Louis	1.42	1.92	3.84
Chicago	1.50	2.00	4.00
St. Paul & Minneapolis	1.50	2.00	4.00
N. Y., Phil. & Balt.	1.59	2.57	5.15

Fruit by passenger trains will be taken only when the company can furnish cars properly equipped. The following railroad companies have agreed to haul fruit in passenger trains, but the Central Pacific does not undertake to guarantee shippers against failure on the part of the companies enumerated to perform this agreement. It only agrees that if the service is performed by passenger trains the charge therefor shall not exceed the rates above provided: Union Pacific; Chicago & Northwestern; Chicago, Rock Island & Pacific; Chicago, Burlington & Quincy; Chicago, St. Paul, Minneapolis & Omaha; Chicago, Milwaukee & St. Paul; Wabash, St. Louis & Pacific; Missouri Pacific; Pennsylvania and Michigan Central. The attention of agents is called to the fact, which they are requested to communicate to all shippers, that the rates to points east of Ogden are authorized only upon the conditions herein specified. If shippers refuse to sign releases, or accept these conditions, agents are instructed to contract to Ogden only. When ventilators, grates, or doors are left open by or at request of shippers, the carriers will not be responsible for damage or theft, and no claims for losses of this kind will be entertained. Charges on fruit to destination should in all cases be prepaid or guaranteed by responsible parties other than shippers. No particular time is guaranteed, and in no case does the Central Pacific agree that freight will not be transferred en route. Shippers must assume all risks arising from the perishable nature of the freight.

RAILROAD LAW.

Duties of Sleeping Car Companies.

A dispatch from Chicago, March 31, says: "The Supreme Court of Illinois, the full bench assenting, has just filed an opinion declaring in substance the Pullman Palace Car Co. and like corporations common carriers, and placing them in the same category with railroad companies. This is contrary to the decision given by the same tribunal some years ago, and affirms the principle the present State Legislature has endeavored to embody in the statute. The suit was brought by Luke Nevin against the car company for refusing to permit him to occupy a sleeping berth assigned him, which he offered to pay for. The lower courts decided that the plaintiff had no power to enforce accommodations from a car company, and it was optional on its part to furnish the same. The Court asserts that the running of sleepers has become a business of social necessity, and in this view the law can impose obligations on the company the same as on railways, ferrymen or innkeepers. In the language of the opinion, when, therefore, a passenger who, under the rules of the company, is entitled to a berth at the usual fare, and to whom no personal objection attaches, enters a company's sleeping-car at the proper time for the purpose of procuring accommodations, and in an orderly and respectful manner applies for a berth, offering or tending the customary price therefor, the company is bound to furnish it, provided it has a vacant one at its disposal. For breach of any of these implied duties the Court holds the company clearly liable."

OLD AND NEW ROADS.

Allegheny Valley.—This company pays $9.50 in cash on each $35 coupon, due April 1, on the income bonds. The balance is payable in scrip convertible into new bonds in accordance with the terms of the bonds.

American Steamship Co.—At the annual meeting in Philadelphia, April 3, the report for 1882 showed the receipts to have been from freight $464,841.60; from passengers, $408,369.74; other sources, $3,387.28; total, $876,598.62. The operating expenses were $767,063.78; expenses of agencies at Philadelphia, Liverpool, New York, Chicago, and all sub-agencies in America and Europe, etc., $72,167.31; advertising in Europe and America, $22,785.51; wharf expenses at Philadelpha and Liverpool, etc., $18,643.79; expenses of general office, $6,146.09; interest paid on mortgage bonds of the company, $88,800, leaving a deficit for the year of $99,007 86.

Atchison, Topeka, & Santa Fe.—The following statements are obtained from advance sheets of the report of this important company for 1882. The Atchison system now comprises 2,620 miles, in four divisions, of which the principal is the main line and branches, aggregating 1,820 miles, in Kansas, Colorado and New Mexico. The others are the Southern Kansas system of 398 miles, the Sonora system of 350 miles, and two small roads, owned jointly with other companies, and aggregating 51½ miles. The earnings of the main line and branches, an average of 1,815 miles in 1882 and 1,695 in 1881, were:

	1882.	1881.	Increase.
Earnings	$14,773,305	$12,584,508	$2,188,797
Expenses	8,637,256	8,037,826	599,430
Net earnings	$6,136,049	$4,546,682	$1,589,367

To the net earnings are to be added receipts for track rentals from other companies, less rentals paid, $54,081; dividends on stock of other roads, etc., $231,313; from land grant and land income trusts, etc., $239,165; and earnings from United States and pool balances, $611,295, make the total net receipts $7,271,903. The fixed charges paid or payable from these receipts are: Interest on Atchison, Topeka & Santa Fe bonds, $1,122,347; on land grant bonds and land income bonds, $239,165; sinking funds, $170,625; on bonds of leased roads, $814,859; total interest, $2,346,896; rental of rolling stock, $25,500; dividends, $3,324,704; total fixed charges and dividends, $5,697,189; balance of profit and loss account charged off, $486,334; surplus of the year, $1,088,380. In addition to the above surplus from operating, the surplus receipts of the land department, over and above expenses, and taxes and interest on its land grant and land income bonds, amounted to $417,058, which has been set aside for the purpose of reducing the land trust indebtedness. Since January 1, 1883, there have been paid off $420,000 of the $438,000 land income bonds outstanding on that day.

The gross earnings of the Kansas City, Lawrence & Southern Kansas system in 1882 were $1,336,704, being an increase of 50.86 per cent. over 1881. The expenses were $724,512, being an increase of 32.01 per cent. over 1881. The net earnings were $612,192, being an increase of 31.54 per cent. over 1881. The net land receipts from the land grant of this road in 1882 were $48,610 and the receipts from miscellaneous interest $905. The Sonora system consists of the New Mexico & Arizona Railroad, 87.78 miles, extending from Benson Junction on the Southern Pacific to Nogales on the Mexican border, where a junction is made with the Sonora Railway. This line of road was completed late in the year 1882, and the earnings and expenses to Dec. 31, which were trifling in amount, were charged out in the construction accounts. The Sonora Railway, extending from Guaymas to Nogales, was completed on Oct. 25, 1882. The earnings from all sources during the year were $213,847; the operating expenses were $100,081; the net earnings were $113,766. The road is now practically completed, although additional expenditures are being made in 1883, amounting to about $225,000, to meet the rigid requirements of the government. The total amount of cash subsidy earned from the Mexican government on account of the construction of the road amounts to $2,956,114. Of this amount there had been paid up to Dec. 31, 1882, $934,710. The outstanding first mortgage bonds on this property are $4,157,600, bearing interest at 7 per cent., which is guaranteed by the Atchison Company. The capital stock, all of which is owned by the Atchison Company, is $5,248,000.

The closing general summary of the report contains these deductions: "It seems only reasonable to expect that, as the resources of the country tributary to the line are developed, the business of the road will show a corresponding increase. That these resources are being developed is apparent from the fact that it carried 224,063 passengers and earned from passenger receipts $691,967 more in 1882 than in 1881. West-bound freight business increased sufficiently not only to replace the decrease in the transportation of construction material for the new lines in the Southwest, but added 65,764 tons, with $276,234, to west-bound earnings, while the east-bound tonnage (which represents the producing power of our tributary country) increased 259,086 tons, with $1,209,344 of earnings. Of this 2,620 miles of road, nearly 1,700 miles are now in steel rail. The iron rail remaining is almost exclusively on branch roads. The whole road, having all the facilities for doing business, is well constructed and in excellent condition, and possesses an equipment of nearly 10,000 passenger and freight cars and 343 locomotives. The company has no floating debt."

Atlantic and Pacific.—The Boston *Advertiser* says: "Less than 50 miles remain to be completed on the Atlantic & Pacific Railroad, and 60 days will doubtless see the road open to the Pacific. The material for the pile bridge across the Colorado River is on the ground, and the pile driving is in progress. This will be only a temporary bridge, and the permanent structure contemplated will probably be built next season. The steel rails for the remaining track are all on the ground or en route from Cleveland and Chicago. Some misapprehension seems to prevail regarding the position of the subscribers and the syndicate regarding the Atlantic & Pacific securities soon to be delivered, and the various explanations given by evening papers have served to deepen the mystery. Up to the present time, the subscribers have paid 35 per cent on all their subscriptions to the blocks of $880 each, and the Seligman syndicate has paid 52½ per cent. Under the terms of the subscription, the company reserves the right at any time before 40 per cent. of the subscription has been called and paid, to sell at par and accrued interest any part or the whole of the first mortgage bonds pertaining to each block, but not less than 5 per cent. thereof at any one time; the proceeds thereof to be first applied to the uncalled portion of the subscription, and thereafter to the repayment to the subscribers, or holders of certificates, of the installments paid by them. The company will be entitled to withdraw from each block an amount of income bonds equal to 25 per cent. of the first mortgage bonds it so sells. Should the company avail of the above right in full and sell all the first mortgage bonds pertaining to each block, then in such case, the holder of each certificate will be repaid all installments, with interest, and receive $440 in income bonds and $440 in full-paid capital. In other words, the syndicate will take all the first mortgage bonds and return to the subscribers the amounts they have already paid, with interest, and have the subscribers entitled to receive as a bonus for their subscription, 50 per cent., or $440, of income bonds, and 50 per cent., or $440 of stock. As it stands at present, the subscribers have paid in 35 per cent., or $318 on each block, and the syndicate has called 52½ per cent. Should the syndicate call, as it undoubtedly will, the remaining 12½ per cent., it will have paid 65 per cent., or $562, on each block. This will give the subscribers, for their $318 paid, $318 in first mortgage bonds, 75 per cent., or $238.50 in income bonds on their 35 per cent. paid, and 50 per cent., or $281, in income bonds on the 65 per cent. paid by the syndicate; also 50 per cent., or $440 in stock. To make it still clearer, suppose the amount of a certain subscription to be $100,000, on which $35,000 has been paid. The subscriber will receive $35,000 in first mortgage bonds, $58,750 in incomes and $50,000 in stock. Should the syndicate elect to call all the first mortgage bonds, it would return to the subscriber $35,000 with interest, and he would receive $50,000 in incomes and $50,000 in stock as a bonus."

Augusta & Knoxville.—Notice is given that the coupons due Jan. 1 last will be paid on presentation to the Augusta Savings Bank in Augusta, Ga., the company having succeeded in raising the money to pay them.

Bellaire, Zanesville & Cincinnati.—Work has for some time been in progress on the extension of this road from Woodsfield, O., to Zanesville, 68 miles. Tracklaying was recently begun at Woodfield. Tracklaying has also commenced at the Zanesville end, and it is the expectation to have the line completed and cars running by August. The Perryopolis tunnel, between Caldwell and Sarahsville, is now 230 feet underground and forging steadily ahead with a large force of hands at both ends.

Cape Fear & Yadkin Valley.—At a meeting held in Fayetteville, N. C., April 4, the stockholders voted to accept the recent act of the North Carolina Legislature authorizing the sale of the state interest in the road. President Gray thereupon paid over to the State Treasurer the sum of $143,675, and received all the stock and bonds heretofore held by the state.

Carthage & Adirondack.—This company has been organized to build a railroad from Carthage, N. Y., to Harrisville, and thence to the iron ore beds, 10 miles east of that place. The road will be about 20 miles long, and will follow the line of an old wooden road, abandoned several years ago.

Central Iowa.—At a meeting of preferred stockholders in Boston, April 4, a committee was appointed to investigate the affairs of the company with relation to the rights of the preferred stockholders. The committee will report to an adjourned meeting.

Central Vermont.—The *Boston Advertiser* of April 4 says: "The title of the new railway corporation which is to succeed the Vermont Central and the Vermont & Canada is to be the Consolidated Railroad Co. of Vermont. Under the decree of foreclosure it will probably acquire title to the property one week from to-day, and will no doubt be organized at once. It is probable that the new company will lease the lines to the present Central Vermont Co. to operate, thus availing of the complete organization of the last named company, and retaining possession of the several roads leased to that company."

Cincinnati, Indianapolis, St. Louis & Chicago.—At a meeting of the board in Cincinnati last week, a statement for the months of January, February and March showed the net earnings to be $225,000. The sum required to pay the 1½ quarterly dividend, including interest and taxes, was $270,000, showing a deficit of $45,000 on that quarter. Notwithstanding the loss sustained by the February flood, the earnings of the road now are very large, and the board decided to pay the usual quarterly dividends, expecting to make up the loss within the next three months, being influenced by the fact that the company has a surplus to the credit of the profit and loss amounting to $32,000, and by the further fact that the road has an income from sources other than earnings for the year ending June 30, such as rents, income for elevators and branch lines owned is estimated to be $70,000, or 1 per cent. on the stock. The earnings for the month just past as compared with the same month last year show an increase of $28,685, or 14.2 per cent.

Cincinnati Northern.—A circular has been issued setting forth that this company will issue interest-bearing scrip for the coupons on the first mortgage bonds, which matured and will mature Oct. 1, 1882, April 1, and Oct. 1, 1883, and April 1, 1884. The circular states that this is in accordance with the agreement of consolidation with the Toledo, Cincinnati & St. Louis Company.

Cincinnati, Washington & Baltimore.—The stockholders of the Baltimore Short Line met in Athens, O.,

March 31, and voted to sell their road to this company in accordance with the plan of reorganization.

Denver & Rio Grande.—The last rail on this company's extension to Salt Lake was laid last week near Green River, Utah, towards which point the tracklayers have been working from both ends of the line. The company has now a completed line from Denver to Salt Lake, 734 miles in length. Of this the section from Salt Lake to the Colorado line, 272 miles, is owned by the Denver & Rio Grande Western Co., a separate organization, which is entirely controlled by the Denver & Rio Grande. Regular trains will be run over the whole length of the line about the end of April.

Georgia Pacific.—The Richmond & Danville Extension Co. offers for subscription until April 10 the entire issue of $3,000,000 Georgia Pacific first-mortgage bonds at 82½ and accrued interest. Payment may be made 15 per cent. on April 16, then 15 per cent. monthly for five months and the final installment of 10 per cent. on Oct. 15 next. These bonds are at the rate of about $10,000 per mile. They bear 6 per cent. interest and will mature Jan. 1, 1922.

The tracklayers working eastward from Columbus, Miss., have now 55 miles of track laid, bringing the road into Walker County, Ala., and to the edge of the Warrior coal field. Preparations are being made to mine coal extensively on the line of the road.

Grand Trunk.—There are reports of an attempt to bring about some union of interests or at least a better understanding between this company and the Canadian Pacific. Negotiations are said to be in progress in London.

Ithaca, Auburn & Western.—A lease of this road has been agreed on, and a meeting of the stockholders is called to ratify it. The call does not give the lessee's name, but it is understood that the agreement is with the Southern Central Company.

Hannibal & St. Joseph.—At a conference of large stockholders in New York, March 31, it is said that two satisfactory propositions were made; the first was to build a road from Quincy to Chicago, and to issue Hannibal & St. Joseph 6 per cent. bonds for the purpose, with a privilege in Hannibal & St. Joseph preferred stock to go with each bond. The second proposition was to issue bonds at the rate of $25,000 per mile on the new road, each bond being entitled to 10 shares of stock in the new road. The bonds with the privilege would be offered to the stockholders of Hannibal & St. Joseph *pro rata*.

Kansas City, Fort Scott & Gulf.—Track on the Memphis Extension of this road is now laid to Augusta in Oregon County, Mo., close to the Arkansas line. The new terminus is 15 miles beyond the last point noted, 139 miles from Springfield, Mo., and 340 miles from Kansas City. It is expected that trains will run to the Iron Mountain crossing at Hoxie by June 1, and to Memphis in August.

Louisville, New Albany & Chicago.—It is stated that this company has finally decided to locate its principal repair shops at Monon, Ind., the crossing of the Main Line and the Air Line Division. The people of LaFayette had offered a liberal subsidy to secure the shops in that town.

Manhattan.—In the suit to set aside the amended lease of the Metropolitan Elevated lines, the New York Superior Court has granted a preliminary injunction restraining the Manhattan Co. from doing anything under the lease, especially from paying dividends.

Notice is given that the Mercantile Trust Co. will purchase from holders of first preferred stock their claims to the quarterly dividend lately declared.

Massachusetts Central.—The Boston *Advertiser* says: "Governor Butler approved the Massachusetts Central Railroad bill March 23, and it immediately became a law. The company now has until April 23 to secure the assent of all the bondholders to the scheme of reorganization. The failure of a single bondholder to send in his approval will necessitate foreclosure and the organization of a new company. Not quite $3,000,000 of the $3,500,000 bonds have thus far assented. The assent of the remainder, while not an absolute necessity for the execution of the company's plan, will, nevertheless, greatly facilitate reorganization.

Memphis & Charleston.—The United States Supreme Court has decided that the company is liable for income tax assessed, under the old law in force from 1862 to 1866. This suit is remanded with instruction.

Mexican Central.—At the annual meeting in Boston April 2, the report presented for 1882 stated that the construction of the main line had not progressed as rapidly as was anticipated at the opening of the year. The two principal causes for delay have been the difficulty in obtaining ties and timber, and the slow delivery of materials by the Mexican Railway Company from Vera Cruz to the City of Mexico. During the year the line has been constructed from San Juan del Rio to Lagos, a distance of 284 kilometres, together with a branch from Silao to Guanajuato, of 23 kilometres. General Manager Fink reports, under date of February 22, 1883, that the line is completed 533 kilometres north from the city of Mexico, including the branch to Guanajuanto. During the year the track on the main line, Chihuahua division, has been laid 336½ kilometres, and grading was completed in addition on 112 kilometres. General Superintendent Robinson reports under date of March 24, 1883, that the track has been completed 500 kilometres from El Paso, south. Following is a statement of what has been accomplished on the Tampico division during the year as reported by Superintendent Whorf:

	Kilometres.
Preliminary lines surveyed	740
Line located	306
Right of way cleared	160
Grading completed	66
Track laid	68
Telegraph completed	115

Superintendent Whorf reports under date of March 7, 1883, that the track has reached kilometre 90. A good force of engineers has been employed upon the Pacific division during the year, and the government has approved the line for 30 kilometres from San Blas. In October the board appointed Charles E. Payne Superintendent of this division. Since that date, grading tools, teams and materials have been forwarded, and grading was commenced in February last. On the Southern Division the government has accepted for payment of subsidy during the year 400 kilometres of road; on the Chihuahua Division, 175 kilometres, and given orders on the treasury department for subsidy certificates amounting to $4,605,500. The treasury department has delivered to the company, on account of subsidy earned, certificates amounting to $1,318,000, on which there has been collected in cash during the year the sum of $969,142.83. Up to March 1, of this year, the total amount of subsidy ordered paid by the government is as follows: For 350 kilometres on the Chihuahua Division, for 450 kilometres on the Southern Division, amounting in all to $6,744,000. Certificates amounting to $1,861,250 had been delivered at that date, and there has been collected on the same $1,134,856.88 in cash.

The total gross earnings for the year 1882 were $1,728,980.55, and expenses $1,024,076.48, leaving net earnings of $699,904.07. And cash collected on subsidy certificates $969,142.83, and the total revenue for the year is $1,669,046.90, Mexican currency, or $1,555,526.05 in United States money.

The road has been supplied, including shipments since January 1, 1883, with 77 locomotives, 79 passenger cars, 1,576 freight cars, and 250 road cars. The amount of steel rails and accessories already shipped from England (a large proportion of which has arrived at Vera Cruz and the City of Mexico) is sufficient for the construction of 152 additional kilometres. The amount of rails and accessories shipped to New Orleans for El Paso is, including those already on hand at the latter point, sufficient to construct 344 additional kilometres. Rails and fastenings are already at Tampico, or on the way there, sufficient to complete 64 additional kilometres. Ample means have now been provided for the completion of the main line, and the president confidently hopes that this work will be accomplished not later than July 4, 1884.

The Treasurer's report showed total assets of $37,536,812.39, and liabilities of an equal amount.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of March 17:

The "Hidalgo," the pioneer locomotive of the railroad between Irolo and Pachuca, made a trial trip over the road on last Thursday. The entire run over the plains of Xochihuacan was satisfactory, and steam will soon supplant animal power on the road, thus connecting this capital closely with Pachuca.

Telegrams from Matamoros state that the steamer "Peggotty" has just delivered there a large amount of rolling stock, rails, telegraphic apparatus, surveying instruments, etc., for the work of the Mexican National Railroad at that point.

Mazatlan advices state that work on the railway between that port and the city of Durango, crossing the great Sierra Madre mountains, will begin at once. The mountain work of the road will be very difficult, and five or six different routes have been surveyed. The course adopted will probably be that surveyed by Mr. Olagaray.

Railroad work has been resumed to a limited extent at San Blas, to the great encouragement of the people there. The bark "Mary Swan" has just delivered a quantity of railway material from San Francisco.

The Legislature of Morelos has officially recognized and approved of a subvention of $70,000 to the Morelos Railway, originally granted in 1878. Such guarantees as the company may ask will be given by the state, it being provided that no annual payments shall exceed a total of $20,000.

The stock issued for building the suburban tramway between Queretaro and San Juan del Rio has all been taken in Queretaro and is now at a premium.

It is reported that the short railroad between Puebla and San Juan de los Llanos will be presently opened. The Fomento is asked before giving the necessary authorization to carefully inspect the road as fears are entertained of its bad construction.

The Mexican Central Railroad depot at Leon has been completed, and it is said to be the best on the line between Mexico and Leon. The *Gacetilla*, however, complains that it is over 2½ miles from the city, and passengers are put to considerable inconvenience to take the train.

Advices from the Isthmus of Tehuantepec show steady progress in railroad construction in that direction. During the month of February 1,000 men were employed and the road was completed up to kilometre 40 (25 miles) east of Salina Cruz. The working force will be increased to 2,000 and it is hoped to reach kilometre 50 by the end of this month. The 25 miles of completed road on the east side of the Isthmus, built by the former company, is reported to be in bad condition, owing to neglect. During February 150 laborers were at work on that end making repairs.

Nashville, Chattanooga & St. Louis.—The directors of this company decided to pass the next dividend in order to pay off loans issued to complete new lines of road. The last semi-annual dividend of 1½ per cent. was paid April 20, 1882.

New York City & Northern.—A plan has been suggested by the Committee of Five of the holders of the first mortgage bonds of the road for the reorganization of the road, which is at present in the hands of a Receiver. The proposition is that the present first mortgage shall be foreclosed. In the reorganization, it is proposed to make the new mortgage equal to the present—$4,000,000—and $1,000,000 besides, or $5,000,000 in all, the bonds to run 40 years, and bear interest at 6 per cent. semi-annually, with 1 per cent. accumulative sinking fund. The extra $1,000,000 of bonds under the plan are to be sold and the proceeds applied to the requirements of the road. Out of this sum the branch from Van Cortland station to Getty square, Yonkers, is to be built. In the city of Yonkers the structure is to be elevated. To make a ready sale for the $1,000,000 additional issue of bonds, the coupons of the other $4,000,000 are to be detached and placed in a trust company, under conditions which shall make them non-cumulative. These coupons shall be paid out of the net earnings after those of the additional $1,000,000 have been paid. The mortgage is to be on the main line, the projected branch, and all the property to be hereafter acquired by the company. The second mortgage bonds, amounting to $2,000,000, together with a majority of the stock, are held by the New York Loan and Improvement Co. New preferred stock is to be issued for the $2,000,000 of second mortgage bonds, and common stock for the present $3,000,000 of stock and to satisfy judgment lienors. One half of the $1,000,000 of extra bonds is to be taken by the committee of bondholders, and the remainder by the holders of the junior securities, at not less than par. A certain percentage of stock is to go with each bond. The bondholders are to control the road by voting power until four consecutive coupons shall have been paid on the whole issue of our first mortgage bonds.

New York, Pennsylvania & Ohio.—At a meeting of bondholders in London last week the lease of the road to the Erie was approved by all present.

Another meeting of bondholders of the Bury party was held April 3, in London, at which the lease was denounced, and a committee appointed to take all possible measures to secure votes against it.

New York, West Shore & Buffalo.—On this road between Rochester and Syracuse nearly 3,000 men, 600 horses, 250 carts and wagons, 8 steam excavators, 7 locomotives, 150 cars, 6 pile-drivers and several derricks are being used, and more will be brought into service when the frost disappears. The abutments for the five bridges across the Erie Canal are completed and the iron is now being erected on them. The erection will be completed by May 1. All the heavy excavations between Syracuse and Buffalo have been opened, and the work has been going on in them for two or three months. There are on the whole work 4,000 men, over 1,000 horses, with other plant and tools to correspond. Nearly a million yards of grading have been done, and nearly 10,000 yards of masonry. Materials are being delivered for bridges all along the line, and there is no reason why the contracts for graduation and masonry should not be completed at the stipulated time mentioned in them which in all is prior to Aug. 1 next.

Northern Central.— This company's statement for February and the two months ending Feb. 28 is as follows:

	February.	Two months.
Earnings	$486,865	$986,117
Working expenses	297,429	580,354
Extraordinary expenses	59,724	117,832
Total expenses	$357,153	$698,186
Net earnings	$129,712	$287,931

For the two months there was an increase of $165,198, or 20.1 per cent., in earnings; an increase of $46,774, or 8.8 per cent, in working expenses; an increase of $44,912, or 61.5 per cent., in extraordinary expenses, which include renewals and improvements, and an increase of $73,512, or 34.3 per cent., in net earnings.

Northern Pacific.—Sealed proposals will be received until April 19, at the office of Chief Engineer A. Anderson, in Brainerd, Minn., for clearing, grading, bridging and ties of the Wisconsin Division, from Superior, Wis., to Ashland, about 60 miles. Plans, profiles, etc., can be seen at the office in Brainerd, or at St. Paul, Minn., in the office of the Assistant Engineer.

Oregon Railway & Navigation Co.—The old portage road at the Lower Cascades of the Columbia River has been changed from standard to 3 feet gauge. The equipment formerly used on the Blue Mountain Branch, which was recently changed to standard gauge, has been put on the portage road.

Track on the Baker City Branch is now laid for 15 miles eastward from Pendleton, Or., and work is progressing steadily. The road is under contract from Pendleton to Orodell, 74 miles, and for 20 miles through the Burnt River country, but there are 85 miles of light work in the Powder and Grande Ronde valleys which have not yet been let. No decision has yet been reached as to the point of junction with the Union Pacific's Oregon Short Line. The whole length of this branch from Umatilla to the Snake River at the mouth of Burnt River will be 293 miles.

Philadelphia & Reading.—Track is laid on the Reading, Marietta & Hanover Branch, from the junction with the Columbia Branch southwest to Chickies Furnace on the Susquehanna, a distance of 6 miles. Freight trains are running.

The offer of exchange recently made by the Reading Railroad to the Schuykill Navagation Co., which was declined, is now renewed to the individual stockholders. The terms of the exchange are to give one share of Reading Railroad stock and $4 in cash for two shares of Schuylkill Navigation preferred or four shares of the common stock.

Pittsburgh & Lake Erie. — This company has begun to run through trains between Pittsburgh and Buffalo in connection with the Buffalo, New York and Philadelphia road. The route is by New Castle, Stoneboro, Franklin and Oil City.

Rock Island & Peoria. — The repair shops of this road in Peoria, Ill., caught fire on the night of March 30 and were totally destroyed, with one passenger car and six freight cars. The loss is estimated at $120,000.

Silver City, Deming & Pacific.—Tracklaying was recently begun on this line, and the rails are reported down from the junction with the Atchison, Topeka & Santa Fe and the Southern Pacific at Deming, N. M., northward to Black Mountain, 8 miles. Work is progressing steadily.

Staten Island.—The control of this road, including the ferry between Staten Island and New York, has passed into the hands of parties connected with the Staten Island Rapid Transit Co. It is proposed to extend the old Staten Island road to a new ferry landing nearer the city, and to build a road from that point along the north shore of the island, making it more accessible than it has heretofore been.

St. Louis & Emporia.—This company has been organized to build a railroad from Emporia, Kan., eastward to the Missouri state line.

St. Louis & Eastern.—This company has filed articles of incorporation to build a railroad from East St. Louis, Ill., eastward to Mount Vernon, about 76 miles.

Toledo, Ann Arbor & North Michigan.—President Ashley denies positively the reports that this road had been sold to the Garrison interest and would be worked as an extension of the Wheeling & Lake Erie road. The road is not for sale or lease to the Garrison interest or to any other parties.

Toledo & Indianapolis.—This company began on April 2 to run a train regularly over its road between Toledo, O., and Findlay. Another train will be put on, as soon as the equipment now under contract reaches the road.

Union Pacific.—The suit of Arnold Leo against this company, in which the plaintiff, a stockholder, sought an injunction to restrain the company from issuing any new bonds or securities, and applying the proceeds of their earnings to aid in the construction, operation and maintenance of branch lines, was argued last week before the United States Circuit Court in New York. After long argument Judge Wallace sustained the company's position and refused to grant an injunction for the reason that the complainant had not made a case entitling him to one under the 94th equity rule of the United States Supreme Court, which requires that the plaintiff should be a stockholder at the time of the transactions of which he complains, and that he should show that he had made an effort to induce the stockholders to comply with his wishes. It was conceded that the company had the full power to sell and dispose of any of its assets to meet its liabilities, or for any legitimate corporation purpose. The Judge, in denying the motion for an injunction, said that the case which the complainant had made had received the decided disapprobation of the Supreme Court, which had made a rule broad enough to cover all cases where there was any collusion. He denied the motion for an injunction.

West Jersey.—This company's statement for February and the two months ending Feb. 28 is as follows:

	February.	Two months.
Earnings	$62,055	$123,875
Expenses	42,052	82,298
Net earnings	$20,003	$41,577

For the two months there was an increase of $17,512, or 16.5 per cent., in earnings; an increase of $15,387, or 22.9 per cent., in expenses, and an increase of $2,125, or 5.4 per cent., in net earnings.

York & Peachbottom.—Track is now laid on the extension of this road from the old terminus at Delta, Pa., northeast to the Susquehanna River at Peachbottom, a distance of 5 miles. The road is now 39 miles long, from York to Peachbottom.